

Manufacturers Record

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REFERENCE
DO NOT LOAN

A Challenge to Democracy

AUG 13 1940

The politics being played in the National Defense Program in Washington is delaying preparedness and is nauseating to the American public. It is gravely disturbing to those who view the situation realistically creating, as it does, the impression that our elected representatives and high Government officials are not alive to the seriousness of the situation or are more interested in keeping their jobs than they are in the vital problem of building an adequate national defense. This country must not delay long enough to find ourselves in the same position that France and Britain were a year ago, yet we do not seem to have learned anything from France's fate.

For all practical purposes, we are no nearer to having an adequate, well-equipped Army and Navy than we were three months ago.

Too much haste and ill-considered action at a time like this can cause great confusion and lead to extreme inefficiency, but the present delays do not seem to have avoided any of that. The country is ready and willing to respond to any necessary demand and industry is eager to cooperate in producing whatever the Government may need. It is impossible, however, to get any concrete plan out of Washington, with the result that industry is marking time, and the business outlook is definitely uncertain. Individuals and business corporations have been called on to make material sacrifices, but it hardly seems fair that so much should be expected in the way of patriotic effort while officials in Washington play at politics and think more of getting votes in November than of saving the country.

Democracy has been challenged to show its right to live—a challenge that carries with it a threat to everything this nation has stood and fought for.

AUGUST 1940

THE TWO SIDES OF OUR STORY



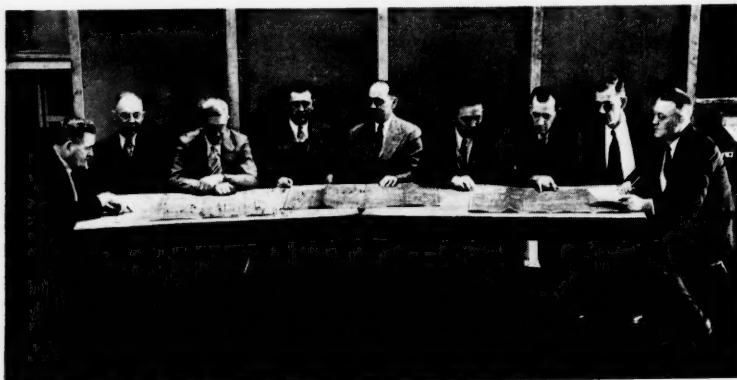
ROANOKE

Seated left to right: L. A. Fielder, H. S. Burkholder, George Bauer, M. P. Bush, W. O. Robertson, W. L. Hoal—Foremen; R. D. Scott, Supt., W. R. Porter, W. I. Kefauver, W. L. Scott, E. V. Willis—Foremen. Standing, Alex. Keenan, Clerk—Average length continuous service—32 yrs.



BIRMINGHAM

L. to R.—E. Smith, S. L. Grubbs, Foremen—J. H. Powell, Supt., R. W. Ryan, Foreman, H. A. Davies, Manager, E. F. Jones, Genl. Foreman, L. P. Griffith, H. K. Mitchell, J. A. Brummett, W. D. Minter, Foremen. Average length continuous service—24 yrs.



MEMPHIS

L. to R.—Carl Warren, Supt., Jno. T. Roberts, E. B. Austin, Ben J. Wactor, Jas. E. Nolen, Basil C. Rose, Arthur D. High, Jas. E. Burkholder—Foremen, Arthur B. Davis, Manager. Average length continuous service—26 years.

For a long time we have emphasized the *Material Side*, telling of the size, strategic location and adequate facilities of our three fabricating plants—but it is the *Human Side* of the story that reveals the spirit and efficiency of Virginia Bridge Service. On this side we are proud to introduce the men who supervise the "behind-the-scene" operations in our plants and whose average length of continuous service with our company is over 27 years.

Virginia Bridge's reputation for highest quality workmanship and dependable service is built on solid foundations — the technical and practical experience of its supervising forces; the training and efficiency of its skilled workmen. Loyal, experienced and conscientious workmen — substantial and respected citizens, whose lives have been devoted to their jobs with our company and the welfare of the communities in which they own their homes.

Such is the calibre and experience of the men who supervise and handle your job when served by Virginia Bridge.

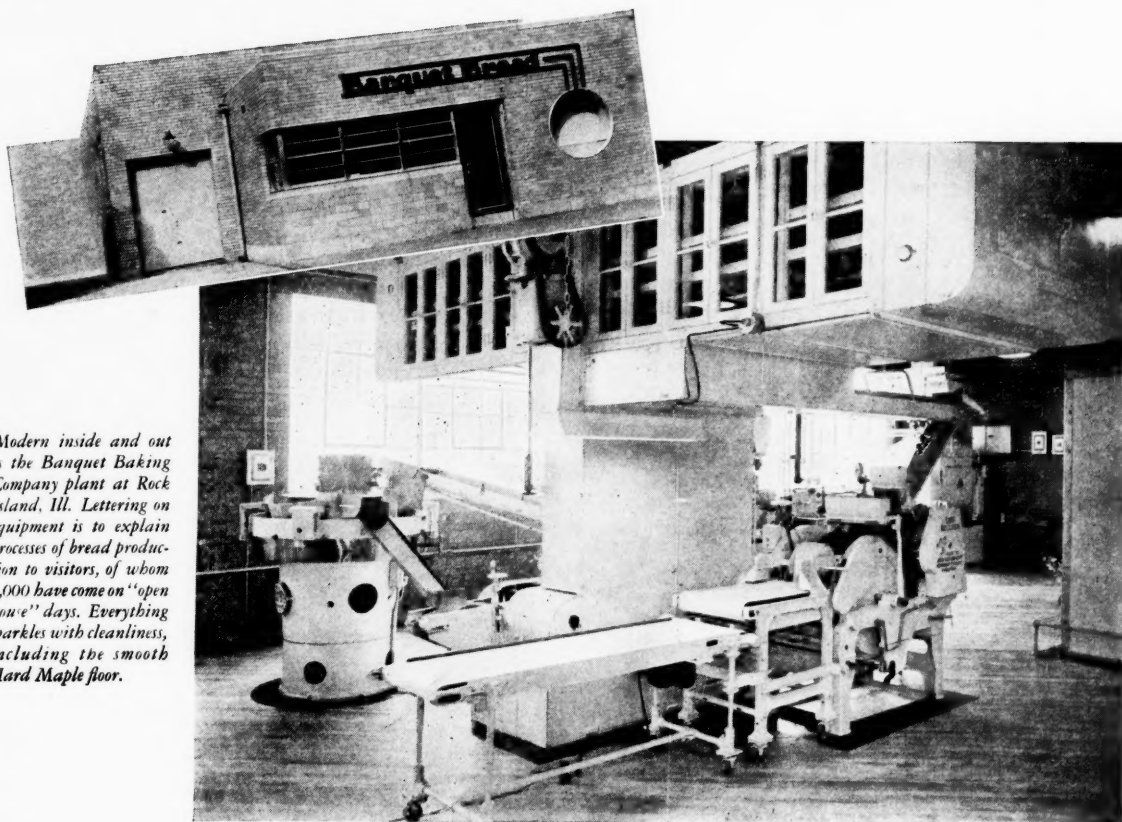
Virginia Bridge

STEEL STRUCTURES

VIRGINIA BRIDGE COMPANY

Roanoke — Birmingham — Memphis — New York — Atlanta — Dallas

Modern inside and out is the Banquet Baking Company plant at Rock Island, Ill. Lettering on equipment is to explain processes of bread production to visitors, of whom 5,000 have come on "open house" days. Everything sparkles with cleanliness, including the smooth Hard Maple floor.



"We Profited by the Experience of Others!"

Says N. A. GEORGE, Manager, Banquet Baking Co.

If you were entering the baking business for the first time, like the Coin brothers of Rock Island, Illinois, owners of this \$100,000 plant, how would you go about selecting equipment and materials?

"Before definitely deciding on the details of our new building," writes N. A. George, the manager, "we visited several of the finest bakeries in the country, making observations so we might profit by the experience of others.

"No small amount of thought was given to the type of floor. After checking all types of available flooring, both wood and other construction, we concluded that Northern Hard Maple would be the ideal material. We believe that our floors of Northern Hard Maple are beautiful and easily kept so, serviceable, and very economical over a period of years."

Experience always says "Hard Maple for bakery floors." For no other flooring offers Maple's combination of beauty, sanitation, comfort, easy cleaning, little maintenance, and long life.

See our catalog data in Sweet's, Sec. 11/78. Write for photographic folder on Hard Maple Flooring and leaflet on heavy-duty finishes for old or new floors.

By specifying MFMA Maple—in strips or blocks—you insure receiving all Northern-grown Hard Maple, association-supervised and guaranteed.

MAPLE FLOORING MANUFACTURERS ASSOCIATION
1797 McCormick Building, Chicago, Ill.

Floor with MFMA Maple

(N O R T H E R N H A R D)



TANKS

for Water Supply and Industrial Service

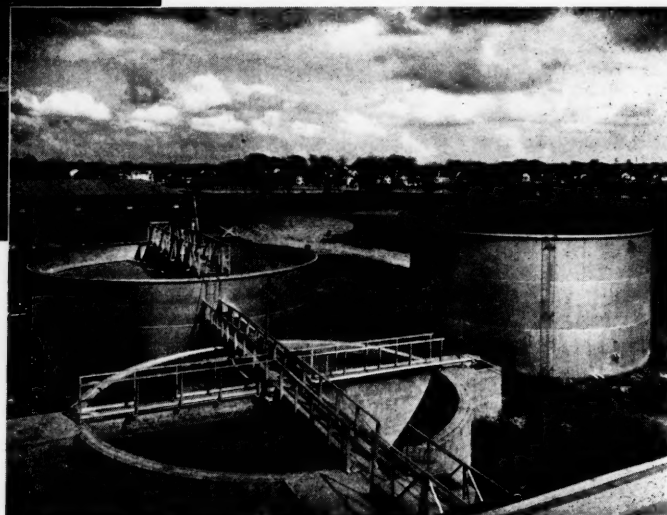
The most dependable way to provide uniform water pressure is to install an elevated steel tank. It holds a reserve above your property ready to flow the instant you need it.

Illustrated at the left is a 125,000-gal. tank at the Southland Paper mill at Lufkin, Tex. Its entire capacity is reserved for the automatic sprinkler system. The instant a fire breaks out, one or more sprinkler heads will open and water will flow from the tank by gravity to quench the flames before they can gain headway.

Elevated steel tanks are built in standard sizes from 5,000 to 2,000,000 gals. capacity. They may be installed for fire protection service—as at the Southland mill—for industrial water supply, or for dual service.

FLAT-BOTTOM steel storage tanks are used for many types of industrial service. The typical installation at the right shows two 47 ft. diameter tanks being used for sewage disposal at a meat packing plant.

Steel tanks are impervious, preventing seepage, and they will not crack. Welded construction provides smooth joints, making the structures easy to clean and paint. Write our nearest office for quotations on standard capacities or special sized tanks to meet your needs.



• The 125,000-gal. tank shown in the upper left view provides gravity water pressure for the automatic sprinkler system at the Southland Paper Mills, Inc. plant at Lufkin, Tex.
• Directly above is a general view of a sewage disposal plant at a meat packing plant showing two 47 ft. diameter steel tanks.

CHICAGO BRIDGE & IRON COMPANY

Birmingham	1530 North Fiftieth Street	New York	3313-165 Broadway Bldg.	Philadelphia	1619-1700 Walnut Street Bldg.
Dallas	1608 Praetorian Bldg.	Cleveland	2216 Rockefeller Bldg.	Detroit	1510 Lafayette Bldg.
Houston	918 Richmond Ave.	Chicago	2106 McCormick Bldg.	Boston	1510 Consolidated Gas Bldg.
Tulsa	1611 Hunt Bldg.	San Francisco	1040 Rialto Bldg.	Havana	Edificio Abreu 402

B-730

Plants in BIRMINGHAM, CHICAGO and GREENVILLE, PA.

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MANUFACTURERS RECORD

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Member A.B.C.

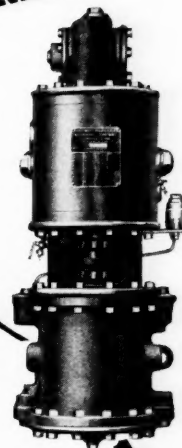
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Investigate!

AIR COMPRESSORS by Westinghouse AIR BRAKE CO.

ONE
of the
MANY
Types



Single
Stage
Steam
Driven

Sturdy locomotive type. Gives long-time service for factory use. Easily installed on post, wall, or stand. For 80 lbs. air and 100 lbs. steam. Sizes 35, 49, and 66 cu. ft. Larger size available, 150 cu. ft., two stage type. " " " " "

Also many types of motor driven compressors up to 200 cu. ft., having exclusive features, and noted for economy, reliability, and durability. "

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and Prices



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Experience

Westinghouse
AIR BRAKE CO.
Industrial Division
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*MEANS QUICKER ACCESS TO MATERIALS AND MARKETS

What F. O. B. Illinois means to Industry

Unexcelled transportation facilities serve all communities. Illinois has the greatest railroad mileage of any industrial state, and the finest system of paved roads of any state.

Illinois has abundant supplies of low cost coal and oil, and a network of electric power transmission lines interconnecting all important industrial centers, assuring adequate and uninterrupted supply of electric power.

Illinois is the center of tool and equipment manufacturing.

Illinois produces and is the central receiving point for raw materials of all kinds.

The labor situation in Illinois is extremely favorable to manufacturers, with a well-distributed supply of labor and a minimum of labor unrest.



Visualize what "F.O.B. ILLINOIS" on your shipments means in terms of every factor that contributes to manufacturing costs, distribution—AND PROFITS.

Investigate the advantages of locating your branch plant or new plant in Illinois, in the center of the *huge middle west market*, close to abundant supplies of raw materials. Check the benefits you will gain from unexcelled transportation facilities, ample labor supply, low cost power and fuel, and a strategic central location.

Special Confidential Report to Executives

Write the Illinois Development Council at Springfield, Illinois, today for a practical presentation of facts about Illinois pertaining to your line of business—a report that will enable you to evaluate the manufacturing and sales opportunities in Illinois. You will receive data on raw materials, labor, taxes, power, fuel, transportation, and product distribution facilities of Illinois as they apply to your business.

Please explain the nature of your business and, if possible, indicate your important objectives, so that a truly practical report can be submitted for your study and consideration. Your inquiry will be kept strictly confidential, and no obligations will be incurred on your part. Address—

ILLINOIS DEVELOPMENT COUNCIL • SPRINGFIELD, ILLINOIS

ILLINOIS

THE STATE OF BALANCED ADVANTAGES

» » » LETTERS « « « AND COMMENTS

Southern Defense Program

As announced in the July issue of the MANUFACTURERS RECORD, a meeting was held on June 10th in Atlanta, Georgia, to coordinate and promulgate efforts of the Southern states in the nation's national defense program. R. L. Gould, Treasurer of the MANUFACTURERS RECORD, was elected Chairman of the Southwide Committee appointed at that time and following are more of the letters received in connection with this work.
—Ed.

* * *

A Pleasure to Cooperate in Every Possible Way

"I regretted my inability to be at the meeting on June 10th in Atlanta, Georgia, as I had intended, but followed your deliberations very closely. I have used your address before the meeting, I hope, to advantage.

"It will be my pleasure to cooperate in every possible way I can in assisting in the very important work you have in mind. I am a member of the Governor's Committee on Preparedness in Tennessee, and only returned from Washington yesterday where I have been for several days on war work. Please keep me advised of anything that can be done in connection with your work."

RUTLEDGE SMITH, Assistant to President
Tennessee Central Railway Company
Nashville, Tenn.

* * *

Considers the Plan of Great Benefit to All

"With reference to your appointment as Chairman of the Southwide Committee for the purpose of assembling information for the War Department in connection with the National Defense Program.

"It is my understanding that this only covers what is termed southern states. My jurisdiction over states served by our line extends only to the Oklahoma-Texas state line, and will appreciate your furnishing me with a list of states to be covered, as I understand it will only include possibly Missouri and Oklahoma. The State of Texas, with the exception of the Panhandle, comes under the jurisdiction of Mr. K. F. Burnett, our Industrial Agent at Galveston, Texas.

"In this connection, it is observed information similar to that which you intend to assemble is being furnished by the different railroads, various state organizations, and in some cases new organizations are being formed, including various groups of states such as is being formed in this case, which overlap in many instances and result in a confusing mass of information, which the federal authorities have little time to digest. Therefore, if some plan such as this could be devised to furnish this information without duplication or overlapping of territories, it would be of great benefit to all concerned.

"Will be glad to cooperate with you as far as possible to this end."

P. E. TAYLOR, General Industrial Agt.

The Atchison, Topeka and Santa Fe Railway Company
Topeka, Kansas.

The territory covered by this Southwide Committee is the same as that which the MANUFACTURERS RECORD serves: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia.—Ed.

* * *

Glad to Furnish Committee with Complete Details

"With regard to the appointment of a Southwide Committee to represent industry, transportation and banking to prevail
(Continued on page 9)

AUGUST NINETEEN FORTY

You

SHOULD KNOW OF THE
ADVANTAGES OF PLANT
LOCATIONS IN THE SEA-
BOARD "PROFIT ZONE."

TRANSPORTATION
VA.
POWER
N.C.
SITES
S.C.
LIVING CONDITIONS
GA.
LABOR
ALA.
RAW MATERIALS
FLA.
CLIMATE
FREE!

SEABOARD
AIR LINE
RAILWAY
THROUGH THE HEART OF THE SOUTH

WE KNOW THE
GOOD PLANT
LOCATIONS!

We cordially invite you to communicate with us with
reference to your plant location problems. Ask us for detailed
studies of suitable locations for business in the Seaboard Southeast.

WARREN T. WHITE, GENERAL INDUSTRIAL AGENT
SEABOARD AIR LINE RAILWAY, NORFOLK, VIRGINIA

INDUSTRIAL DEPARTMENT
Seaboard
AIR LINE RAILWAY



... to a NEW EMPIRE of Industrial Locations

• United Gas pipe lines interlace the Gulf South, offering a fuel unparalleled for industrial use—Natural Gas—at a thousand and one available plant sites.

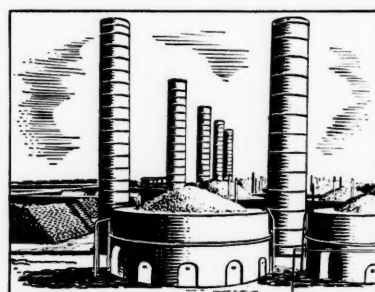
In the five states represented in this New Empire, millions of acres on upland and coast, urban, suburban and rural, await the preference of the plant engineer. Within the region are a multiplicity

of raw materials and basic crops for the producer or manufacturer. Overnight lie fast growing regional markets.

Land and Natural Gas complement other Gulf South industrial advantages—abundant power—mild climate—quick, convenient transport to world markets—native, white, reliable, intelligent labor—good schools!

Industry is decentralizing southward to a friendlier atmosphere. Move to the Gulf South where you are wanted and appreciated by your neighbors.

Without obligation, let us make a confidential survey for you to meet the requirements of your industry.



This Gulf South ceramic kiln for the burning of tile, pottery and glazed ware is fired by Natural Gas—one of many such applications of efficient, dependable Natural Gas fuel down here.

For information on GULF SOUTH opportunities write to
SUPERVISOR OF INDUSTRIAL DEVELOPMENT

UNITED GAS PIPE LINE COMPANY

FOR TEXAS, Mail received at: Beaumont, Beeville, Dallas, Fort Worth, Houston, Longview, San Antonio and Wichita Falls. FOR LOUISIANA, Mail received at: Baton Rouge, Lake Charles, Monroe and Shreveport. FOR MISSISSIPPI, FLORIDA and ALABAMA, Mail received at: Jackson, Mississippi.

ALL INQUIRIES CONSIDERED CONFIDENTIAL

COPR., 1940, UNITED GAS PIPE LINE CO.

"Letters and Comments"

(Continued from page 7)

on the United States Government to use available facilities in the Southern states for War Defense purposes every railroad in the South has been contacting Government representatives; state committees, Government representatives in Corps areas and at Washington and I do not know of any instance where these contacts have produced results.

"The Rock Island has available for rent or sale, buildings at Horton, Kansas, and Shawnee, Oklahoma. These buildings have in excess of 200,000 square feet area. The details of these buildings have been placed with various branches of the Government but they advise they are not interested in them at the present time.

"Sometime ago I visited Washington, called on the Munitions Board and other branches of the Government and was advised that the future plans of the Government were all established, that the War Department was familiar with all available buildings and other than operations of existing military defenses, additional plants would not be established unless War were declared, at which time the War Department knew exactly what to do. I have never handled anything that was more confused than this question of utilizing facilities for the War Defense Program—this is the general experience of parties endeavoring to reach the Government authorities.

"If your committee has any success, shall be glad to furnish you complete details of the facilities available on the Rock Island Lines at Horton, Shawnee or vacant lands at other points served by our line."

W. E. BOLTON, Industrial Commissioner
The Chicago, Rock Island and Pacific Railway Co.
Chicago, Ill.

The confusion in Washington referred to above is a thing that is troubling a great number of people and is the subject matter of an editorial on the front cover of this issue.—Ed.

* * *

Considers Conscription "Vitality and Critically Important"

Editor, MANUFACTURERS RECORD:

"Recalling the magnificent, loyal, patriotic and intelligent morale building done by your paper twenty years ago, I am taking the liberty to suggest a subject for the front page Editorial of your August issue.

"It seems to me the issue now in Congress—

"Compulsory Universal Military Training" is about the most vitally and critically important issue that can be imagined.

"Not only the obvious necessity of it in itself, but is it not a fact that every individual in the country, who had a relation or friend in training would become a still more ardent advocate of speedy arms production?

"If this is true, should not every newspaper and every citizen do every thing possible to bring it about?"

WM. D. LILLY
Lilly, Dungan & Co.
Baltimore, Maryland.

The MANUFACTURERS RECORD is whole-heartedly in favor of compulsory military training as will be seen from the leading editorial in this issue. It is encouraging to receive such letters as the above, and we shall be glad to give space to similar expressions from other readers.—Ed.

* * *

Dr. Wicker's Article "Is a Master Piece"

Dr. J. J. Wicker, MANUFACTURERS RECORD:

"Your article 'What's the Cause of Anti-American Isms' is a master piece. I have read it and re-read it and I am going to see that Garland Jr. reads it.

"I have heard so many reports on the wonderful work you are doing at Fork Union and I never lose an opportunity to speak a good word for your school."

J. G. HOOD, President
West Virginia Coal Company
Richmond, Virginia.

"What's the Cause of Anti-American Isms" by Dr. Wicker appeared in the May MANUFACTURERS RECORD and has been favorably and widely commented on. Reprints of this and other articles by Dr. Wicker are available at a small charge.—Ed.

AUGUST NINETEEN FORTY

A GALVANIZED METAL

you can *Draw* and *Paint!*



*523 Draws...
and not a Dud!*

That's how ARMCO galvanized ZINCGRIP-PAINTGRIP sheets came through for the manufacturer of these fuel reservoirs.

This double-purpose metal meant extra advantages for the fabricator. The 3 1/2-inch draw had no effect on the tightly adherent ZINCGRIP coating. There was no flaking, no peeling of the zinc. No die-scoring either.

Next the bonderized surface of ARMCO PAINTGRIP came into play. This special mill finish permitted quick painting. No etching bother, no loss of the protective zinc coating.

Time and money were saved on make-ready too. Only a soapy water solution was needed to prepare the sheets for the dies. Since oil was not used surface cleaning before painting was easier and less costly.

Maybe you can profit from this double-edged sales mover and shop saver. The experiences of many other manufacturers with ARMCO ZINCGRIP-PAINTGRIP bear this out. Would you like to see the evidence? We'll be glad to show you. The American Rolling Mill Company, 1870 Curtis St., Middletown, Ohio. Offices in all Principal Cities of the U. S.



Armco

ZINCGRIP-PAINTGRIP SHEETS

Defense

DOES IT MEAN
ANY OF THESE THINGS
TO YOU?

- ★ Shifts from one kind of production to another.
- ★ Increases in production occupancy of plants as more hours are worked.
- ★ Higher speeds of production.
- ★ Greater use of automatic and semi-automatic machines and controls.
- ★ Rehabilitation of buildings, equipment and tools.
- ★ Plans for quick catch-up on deferred maintenance and replacement.
- ★ New plants, extensions, and revisions of existing plants.

ON THE JOB FOR YOU

As a customer of a company in the Commonwealth and Southern system, you have available the free services of our power, heating and lighting engineering departments. These trained organizations are at your call in all matters relating to uses and applications of the company services in your operations.

THEN THERE'S A JOB
FOR THE
POWER & LIGHTING ENGINEERS

THE COMMONWEALTH & SOUTHERN CORPORATION

ALABAMA - FLORIDA - GEORGIA - ILLINOIS - INDIANA - MICHIGAN - MISSISSIPPI - OHIO - PENNSYLVANIA - SO. CAROLINA

THE SOUTH IS READY FOR NATIONAL DEFENSE



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GOVERNOR OF GEORGIA
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GOVERNOR OF NORTH CAROLINA



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Porter Cooper
GOVERNOR OF TENNESSEE



W. Warren
GOVERNOR OF TEXAS



Paul B. Heffernan
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James D. Folsom
GOVERNOR OF ALABAMA



WE, THE GOVERNORS...

solemnly pledge our full support to National Defense. In the days ahead . . . in the work that must be done, The South will bear its full share—contribute in full measure. For here are vast resources of men and materials. Here a mild climate permits quick and economical erection of plants—ideal for aircraft, arms and munitions . . . effects savings in pro-

duction . . . conserves fuel and clothing . . . permits outdoor work, training and maneuvers the year 'round. Native-born workers, ample developed power, excellent transportation facilities, deep water Ports are advantages offered by The South which can be utilized to speed up the country's program for National Defense.

Southern Governors' Conference

Bona Allen Building, Atlanta, Georgia

LAWRENCE WOOD ROBERT, JR.
Executive Director

CARROLL DOWNES
Industrial Consultant



AN IDEA BECOMES A REALITY + +

Ideas Are Worth Money!

A recent analysis revealed that the technical knowledge and assistance of a single Burroughs representative had enabled a few department heads and supervisors to save for their employers a total of \$253,500 *annually* in the cost of accounting and statistics.

This amount is the equivalent of a net profit of 5% on a gross sales volume of more than *five million dollars!*

In your office—as in nearly every office—almost every department head and supervisor has at least one idea which, if wisely developed, might reduce certain office costs immediately.

To help your business profit from these ideas, Burroughs representatives offer their experience and technical knowledge of machines, applications and procedures for lowering office costs or meeting changing business conditions.

As our representative counsels with yours, they discuss possibilities, evolve a solution, estimate the savings for your consideration—and another good idea becomes a reality.

Eager to capitalize an idea? Call Burroughs—there's no obligation.

BURROUGHS ADDING MACHINE COMPANY, DETROIT, MICHIGAN

Today's Burroughs

DOES THE WORK IN LESS TIME—WITH LESS EFFORT—AT LESS COST

FOR 50 YEARS THE LEADING *STEEL PIPE*



- **LEADING** *in value*
- **LEADING** *in usefulness*
- **LEADING** *in sales*

FIFTY years ago, steel pipe began its phenomenal growth. Many builders and industrial engineers soon found that this "new kind of pipe" was what they wanted — strong, durable, and low in cost. It proved so practical for so many applications that it moved

to leadership in the following years.

Today finds steel pipe still setting the pace—still ahead of the field—the world's largest-selling pipe—the most practical to use in the vast majority of applications.

During all these years, to satisfy the

changing needs of industry, NATIONAL Pipe, though still fundamentally the same strong steel pipe of fifty years ago, has been constantly improved. NATIONAL Pipe today is cleaner, stronger, more uniform, easier to work. Higher quality steels, processes for removal of scale, methods of retarding corrosion — all have contributed to give the greatest value per dollar of cost.

Distributors, located in strategic parts of the country, are at your service.

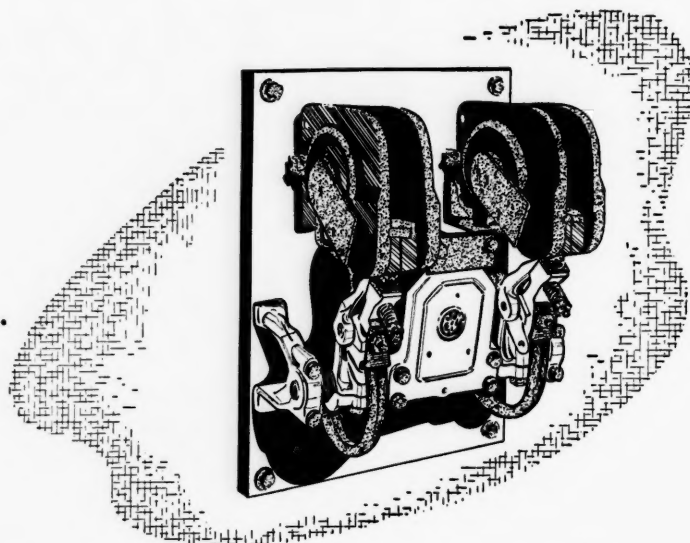
NATIONAL TUBE COMPANY

PITTSBURGH, PA.



Columbia Steel Company, San Francisco, Pacific Coast Distributors • United States Steel Export Company, New York

UNITED STATES STEEL



CONTACTORS* CAN'T WAIT FOR WEIGHT, EITHER

A split second is an eternity in the electrical contactor pictured here. Know what happens?

For instance, you have an electric motor to start or stop—fast! So you operate a control switch. This contactor shuts or opens with a bang!

A split second is too long to wait for the contactor to act. It has to move as fast as thought itself.

Which is no place for the dragging inertia of needless weight. That's why the moving parts are die castings of light, strong alloys of Alcoa Aluminum.

Right along with the light weight, the maker got in these die castings the strength, the guts, to stand up under the repeated shocks and beating these moving parts must take.

Many of the stationary parts also are Aluminum die castings. In some cases the high electrical conductivity of Aluminum is important. In others, inserts of other metals are cast integrally, and assembly time is saved. And in every part, the accuracy of these die castings called for small finishing expense.

Like every user of Alcoa Aluminum, this manufacturer acquired a whole set of advantages, when he adopted the fundamental principle of lightness in moving parts.

We can help you acquire like advantages in your business. Aluminum Company of America, 2109 Gulf Building, Pittsburgh, Pennsylvania.

**Magnetically operated switches, to you.*



ALCOA · ALUMINUM



WE NEVER TIRE
OF HEARING YOU
SAY "Rush!"

1. An order for power-house repairs was telephoned to our Pittsburgh Warehouse at 8:00 o'clock one morning.
2. The order was for about 13 tons of plates and the customer, being in dire need, was greatly excited and worried.
3. A truck was loaded at once and the order arrived at destination, 46 miles from Pittsburgh, at 12:45 P. M.—just 4¾ hours after order was phoned.

YOU can depend upon cheerful as well as prompt service from Scully. The word "rush" is music to our ears, because that's the spirit of our business and the symbol of Scully Service. Our customers always want quick service—even when there's no real emergency. So each of the eight Scully Warehouses operates on the basis that you always need your orders in a hurry . . . and we

always hurry whether you ask us or not.

Why not see for yourself why Scully Service is famous? The next time you need steel, steel products, copper or brass—call Scully—the warehouse nearest you will spring into action.

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The Mark of Service

ALLOYS
ANGLES, HOT ROLLED and COLD ROLLED
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BANDS and HOOPS
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ALLOYS (HR and CR)
COLD FINISHED
ELECTRIC HIGH CARBON STEEL REINFORCING
BEAMS and C. B. SECTIONS
BEEF RAIL
BOLTS, NUTS, WASHERS, ALL KINDS
BORING and TURNING BARS and GRINDERS
BRACES, BOILER
CHAIN, ALL KINDS
CHANNELS
CHISELS
CHUCKS, STAYBOLT
CLAMPS, BOILERMAKERS
CLIPS, PATTERSON
CLEANERS, FLUE
CONDUCTOR PIPE
COPPER and BRASS
COUPLINGS, HOSE
CRAYONS, SOAPSTONE
CUTTERS
DARDELET RIVET and MACHINE BOLTS
DRILL RODS
EAVE TROUGH and FITTINGS
EXPANDERS, FLUE
FERRULES, COPPER
FLANGES, BOILER and TANK
FLOOR PLATES
GALVANIZED SHEETS, BARS, BANDS
HANDLES, HAMMER
HEADS, TANK and FLANGE
HOISTS, HAND and POWER
IRON, STAYBOLT
LUGS, BOILER, TANK and SILEO
MACHINERY, HAND and POWER
MANHEAD PLATES and FITTINGS
NAILS
PACKING
PAINT STICKS
PLATE STEEL, STANDARD QUALITIES
ABRASION RESISTING
COR-TEN and MAN-TEN
PLUGS, FLUE
RAILS and FITTINGS
REAMERS
SHAFTING
SHEETS
ABRASION RESISTING
ELECTRICAL
COR-TEN and MAN-TEN
HOT ROLLED and UNIFORM BLUE
WELLSVILLE POLISHED
COLD ROLLED
STAINLESS STEEL
GALVANIZED and GALVANNEAL
LONG TERNE
CORRUGATED
U.S.S. COPPER STEEL
SPRING STEEL BARS and SHEETS
STAINLESS STEEL
STRIP STEEL, CR and HR
TEES
TIRE, ROUND EDGE
TOOLS, HAND and POWER
for BOILER and IRON WORK
TROLLEYS
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Dresses that grow on trees

Since 1930 rayon production in the United States has increased more than 300 per cent. And much of the rayon used in smart clothing, in house furnishings, automobile tires and many other commercial and industrial products comes from a cellulose base made from ordinary wood pulp. This Cinderella transformation produces a rayon fibre that has distinct qualities found in no other textile yarn.

The vast supply of these raw materials has made Dixie of vital importance in the rayon field. To meet

the growing demand many factories, converters and fabric manufacturers have concentrated in this section.

The expansion of the rayon industry calls for steel in many forms: structural steel for factory buildings and warehouses; sheet steel for ducts and roofing; steel pipe for various processing operations; steel plates for tanks, vats and machinery. Bethlehem's plant at Sparrows Point, Maryland, is excellently situated on tidewater to supply the steel needs of this and all other Southern industry.

BETHLEHEM STEEL COMPANY



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You can obtain Roebling Wire Rope of identical constructions in several different grades or qualities. But—if it's *maximum* safety for workers and loads that you want—*lowest* wire rope replacement cost—then Roebling "Blue Center" is the rope for you.

Nearly 100 years of wire fabricating experience have gone into the development of Roebling "Blue Center" Wire Rope. It is Roebling's highest achievement in wire rope manufacture. Specially developed, through years of research, to provide maximum rope durability, safety and economy—Roebling "Blue Center" has established unexcelled records for long, low cost service.

Try this rope on your cranes, hoists, or other rope-rigged equipment. Keep accurate service records. Compare. We are confident you will agree with other users—that Roebling "Blue Center" assures the utmost of safety—and lowest rope replacement cost.



JOHN A. ROEBLING'S SONS CO.
Trenton, N.J. Branches in Principal Cities



YEARS OF RESEARCH DEVELOPED "BLUE CENTER"

Years of research have gone into the development of Roebling "Blue Center" Wire Rope.

Furthermore, the development and improvement of Roebling "Blue Center" is a never-ending process. A planned program of research is carried on ceaselessly in the Roebling Research Laboratory—one of America's most modern and completely equipped research units.

ROEBLING "BLUE CENTER"... The Finest of all Roebling Wire Ropes

RESCUED WITH A BY-PASS

A CASE STORY

SOLVED
WITH
PREVENTIVE
MAINTENANCE



"Man alive"—shouted the SUPERINTENDENT—"we just replaced that valve a short time ago!"



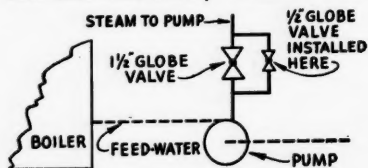
"But we can't let the pump run wild"—the PLANT ENGINEER tried to explain.



"Sure enough"—said the CRANE MAN—"but Preventive Maintenance will stop the source of trouble."

AN eastern plant was having endless trouble with a valve on the boiler feed pump. It was a steam-driven pump—controlled with a 1½-inch globe valve.

Under peak loads or in an emergency, this valve was ideal. But for normal feed-water needs it was much too large. Most of the time the steam was throttled so close that the disc and seat were barely "cracked." As



a result they soon became wire-drawn and the valve began to leak—a dangerous and wasteful condition.

Pulling the fire to make valve repairs was costly. A permanent remedy for the trouble had to be found. "Here is a case for Preventive Maintenance," said the Superintendent as he called in

D. N. G., the Crane Man, on the problem.

Preventive Maintenance counseled the installation of a ½-inch globe valve in a by-pass line around the present valve. With the large valve closed tight, the ½-inch valve, when fully open, would assure ample steam for normal pump operation. For emergency loads, the 1½-inch valve would be available—but rescued from severe throttling service.

Results: (1) The trouble was eliminated—permanently, easily. (2) Again Preventive Maintenance paid for itself many times over. (3) Another management knows that it can rely on Crane for sound advice and the right valves and fittings to solve every piping problem. Knows, too, that it's best to call the Crane Representative whether the trouble is big or little.

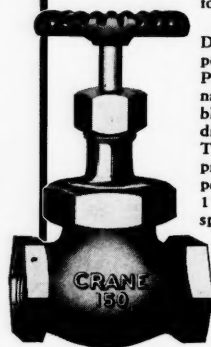
This case is based on an actual experience of a Crane Representative in our Syracuse Branch.

FINE FLOW CONTROL WITH CRANE BRASS PLUG DISC VALVES

In any service—steam, water, oil, gas—where valves must operate in partly open position or are frequently opened and closed, in every way these valves will give better performance than you would expect.

Crane plug-type disc construction assures accurate and easy regulation of flow, and a longer life of positive tightness. The wide seating surface and the perfect combination of alloys in the tapered disc and seat give unusual resistance to the damage of foreign matter and wire-drawing, to wear and galling. A sturdy brass body and careful engineering in every part make these valves extra fit for the toughest jobs.

Crane Brass Plug Disc Valves are the popular choice for Preventive Maintenance on sootblower, blow-off, boiler feed, drip and drain lines. They're made for pressures up to 350 pounds at 550°. For 150 pound lines, specify No. 14½P.



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VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

NATION-WIDE SERVICE THROUGH BRANCHES AND WHOLESALERS IN ALL MARKETS

MANUFACTURERS RECORD FOR



CONSCRIPTION

As this is being written, there is before Congress a bill for selective training and service in the United States Army and Navy which, if passed, as it probably will be, will call anywhere from one to three million men to arms in this country during the next two or three years. In the light of developments abroad since the Nazi invasion of Belgium and England's grave peril, no sane man will argue the need for an adequate protective armed force for this country. The only possible thought in that connection is that already we might be too late in taking the proper steps not only to withstand invasion, but to protect our foreign shipping and to enforce the Monroe Doctrine. As things stand, the British Navy is the only protection we have in the Atlantic. The situation is serious and demands action. And, unfortunately, under modern methods of mechanized warfare it is impossible for a peaceful nation to spring to arms overnight, ready to take the field against a well-equipped, well-trained foe.

Modern armies are intricate, complex organizations comprised of highly-trained specialists in many different fields, all of whom have to be equipped with expensive, highly efficient machinery. To be proficient and equipped for their job, months, if not years of intensive training are required. The campaigns of the Allied Armies in Flanders and Norway late this spring showed the devastating loss of lives and materiel which inevitably results from any other course.

This country must be prepared for any eventuality and to be prepared it is necessary to train an army and navy over a sufficient period to make them proficient in the use of their arms.

However, the impact on the nation's economy of any conscription which will take most of the Army's and Navy's needed man power from private industry, will create a serious problem. Industry is the backbone of this country and, more than ever in modern warfare, the backbone of the nation's armed force. It has been reliably estimated that in waging war today only 25% of the effort is made by the armed forces while 75% of the burden is carried by the civilian population in producing the necessary material and equipment. Conscription from the ranks of private industry should be delicately handled and avoided wherever possible when other sources are available.

It is only logical and right that before men are drafted from private industry that the C.C.C. should be taken into the Army and men physically qualified on Federal work relief rolls should be given the choice of finding private employment or of enlisting in either the Army or Navy. The load on private industry of carrying our present vast machinery of Government should be lightened if possible and if not, made no heavier than is absolutely necessary. Three million men from the ranks of private industry would not only cripple our productive facilities, and even now a shortage of skilled labor is being keenly felt, but would increase to over thirty million the number of people now dependent on the Federal Government in whole or in part for their livelihood.

Using our present regular Army Reserves and the National Guard with the C.C.C. and those available from public relief rolls, the demand for man power from private industry should be negligible for many months to come.

"The South's Resources"

Work on "The South's Resources," to be published by the MANUFACTURERS RECORD about September 1, was really started in May 1938 with the publication of the first of a series of resource maps and articles covering each of the Southern states which continued until the fall of 1939. More than two years' effort has gone into an issue which should be of inestimable value in showing the vast natural wealth and developed facilities of the South for industrial expansion. It will be a comprehensive, factual survey of what the South possesses and therefore of interest to industrialists in all parts of the country.

To manufacturers located outside of the South, it offers an opportunity as a frontier for further development, and to Southern industrialists it offers a challenge to make the greatest possible use of the South's wealth.

The issue will contain 17 maps printed in three colors, many illustrations of outstanding plants in each of the 16 Southern states, with approximately 150 pages of supporting data and reading matter.

It can be used to determine the location and availability of raw materials for all kinds of manufacturing, to estimate the size and value of the Southern market for all types of industrial equipment and manufactured products, and to assist in determining profitable plant locations for new enterprises, as well as a reference on a wide variety of subjects for all of those who are interested in the South and its development.

Nothing like it has ever been attempted before, and its publication now, coming at the beginning of a new expansion period in the South and at a time when the nation is building for defense, gives it a particularly timely value.

Diversified Agriculture

Elsewhere in this issue there is an important article by Dr. Paul Kolachov entitled, "The Possibilities of a Domestic Essential Oil Industry," which offers definite, specific suggestions for a solution to at least part of our national agricultural problems.

Under the impractical theories of the agricultural administration and in spite of huge Federal subsidies, we have seen a critical drop in our exports of cotton, wheat, and other agricultural products and no corresponding increase in domestic consumption. The farmer's position has been acute for many years and particularly so during the depression, but aside from making it a football of the politicians, nothing constructive has been done about it.

Dr. Kolachov points out an available market worth \$14,000,000 a year which is the amount

now spent abroad for our aromatic plants and essential oils which could be produced in this country. In showing the profitable domestic production of aromatic plants, he compares the production costs of corn and cotton and a few varieties of aromatic plants such as coriander, caraway, anise, fennel, angelica, and licorice, most of which are particularly adaptable to the climate and soils of the Southern states. For example, cotton costs between \$16 and \$17 per acre to produce, yields an average of 250 pounds to the acre, and brings a cash return to the farmer of approximately 80c a pound. Licorice root costs about \$30 per acre to produce, yields 2,000 pounds per acre, sells for 5c a pound, giving a total per acre of \$100, as compared with \$20 per acre for cotton. The domestic market for licorice root as determined from 1937 imports is \$150,000,000 annually.

The advantages to be realized in the development of this industry, Dr. Kolachov points out, would be to utilize idle lands, increase farm employment, increase farm cash income and the replacement of surplus staple crops by new crops.

Southern Construction Up

As reported in this month's issue of Construction, contracts awarded in July in the 16 Southern states reached \$131,869,000, second to only one other month in the South's construction history—June, 1930.

Much of the increase was due to Government construction, but privately financed industrial work was also higher than in any other month during the last eight. Industrial contracts awarded amounted to \$21,903,000 while contracts announced for future award totaled \$39,524,000. Among the contracts awarded were many items of large proportions and important to the South. These included the new \$3,000,000 plant of the Florida Pulp and Paper Company near Pensacola, details of which appear on another page, the \$2,250,000 expansion program of the Bibb Manufacturing Company of Georgia, and a \$4,000,000 power plant for the Kentucky Utilities Company. Perhaps the largest undertaking however, is the Glenville hydroelectric plant and Nantahala project, together involving several million dollars, which have been contracted for by the Nantahala Power and Light Company, North Carolina subsidiary of the Aluminum Company of America. Private construction included one type of work—commercial building—which showed a marked gain over June.

At the same time, government construction largely for national defense amounted to \$50,598,000 including expanded shipbuilding facilities at the Norfolk Navy yard and new or expanded air stations at several southern points.

The South American Market

In an article "More Opportunities for American Producers" in the July issue of the *MANUFACTURERS RECORD* we considered the effect on South America's foreign trade with Italy and France following the overthrow of France and Italy's entry into the war on the side of Nazi Germany.

With the broadening of the British blockade against practically all of Europe, both North and South America are being forced into the position of dealing more and more with one another in an effort to make up for European trade losses.

One phase of this, as we have pointed out in earlier issues, is the opportunity open to American manufacturers for increasing the sale of their products to South American countries as a result of the enforced withdrawal of European competitors in the field. The exports of the axis powers and axis-controlled countries to South America before the war furnish the most accurate yardstick with which to gauge the extent of this market and the opportunity available.

Until the beginning of hostilities in 1939, South American imports from Germany, France and Italy were increasing at a steady rate. For the last third of 1939, however, South America's foreign trade with these countries, and with Germany particularly, fell to an infinitesimal amount.

There is a definite opportunity open to American industry to supply many of the goods previously imported by South America from the countries now controlled by axis powers, especially if some solution can be reached to the problem of finding a market for the exports from South American countries to axis-controlled Europe now cut off by the British blockade. In the matter of exports, of course, particularly in the case of food-stuffs and agricultural products in general, together with some raw materials, South American countries are in direct competition with the United States. A market must be found for those products to enable South America to purchase the machinery and other capital goods products she needs from United States manufacturers.

In 1937, imports by South American countries from Germany, Italy and France and the other axis-occupied countries in Europe were as follows:

Argentina	\$ 71,609,686
Brazil	25,004,155
Chile	6,125,655
Colombia	16,658,800
Peru	9,266,300
Total	\$128,664,596

These figures include such important manufactures as textiles, chemicals, iron and steel, wood

products, machinery and motors, automotive equipment, wood pulp, newsprint, structural iron and steel, electrical equipment, paints, varnishes and explosives.

All of these things can be supplied by American industry, and in meeting the opportunity, manufacturers in the South with their proximity to South American markets, are particularly well located.

Revise Sugar Restrictions

From 1934 till the outbreak of the present war, the sugar industry in the United States struggled along with the somewhat arbitrary sugar quotas, which meant that United States mainland producers not only were restricted as to output but through other governmental controls they were affected by acreage allotments, the Wage and Hour law, plant operation and child labor while on the other hand, foreign producers with large quota allotments were not so restricted.

With the invasion of Poland the American sugar market reacted so strongly that on September 11 the President proclaimed an emergency and suspended all sugar quotas. Seemingly such action would redound to the benefit of all the mainland sugar industry. Such however was not the case, because acreage and other restrictions have continued in force to preclude any noticeable expansion in the growth of domestic sugar cane by the Florida and Louisiana producers. The suspension of quotas also has had a deleterious effect upon the cane sugar refining industry, a sizeable proportion of which is located in the South.

Today, the international situation is fast becoming more serious and foreign commerce is badly disrupted. Therefore it is vitally important that the authorities in Washington should remove quota and acreage allotments.

This would mean that domestic producers would then be free to produce as much sugar as they are able while refiners could import whatever quantity of raw sugar is necessary for them to supply consumer requirements in conjunction with the domestic growers. Since foreign and off-shore sugar is relatively free from government restrictions it can be produced at a lower price than domestic sugar. Therefore it would be necessary to impose a tariff on raw sugar sufficient to protect the domestic producer while a separate tariff on refined sugar importations would similarly protect the domestic refiner.

There is no question that the present situation is intolerable. Under quotas and acreage allotments both the domestic refiner and grower are at a distinct disadvantage and definite remedies are called for.

MORE NEW INDUSTRIES NEEDED

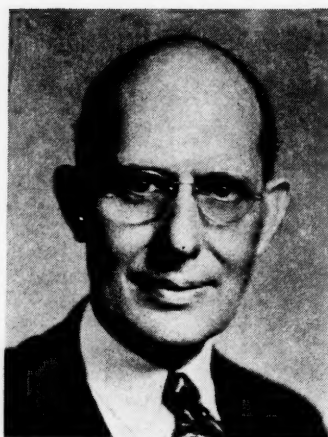
WE have reached a stage in our industrial research where we are beginning to understand what the essential steps are for the development of new industries. This knowledge is so important that I am convinced we are not going to get out of our present economic dilemma, with any hope of remaining out, until it is recognized and understood by all the human forces of industry.

Perhaps no other country in the world has ever had the problem that we have today—the problem of too many men, too much money, and too much material. That we have such an excess can mean to a primitive mind such as mine only that we do not have a sufficient number of projects. I do not profess to know why we do not have more projects. I simply contend that if we had enough projects to broaden our industrial base, there would be no problem of unemployment.

We have been accused of creating unemployment by too many inventions, yet the fact is that we have not enough new things to provide sufficient jobs for all the people who want to work. Someone said years ago that necessity is the mother of invention. Then, necessity for invention was to produce machines and devices which would save human labor, because there were many more things to do than there were hands to do them. Today, necessity is again calling on inventors to produce new things, because we have more hands than we have jobs to do.

But one of the things that is least understood by industry, politicians, and the people in general is the extreme difficulty of getting a new thing started. To do it, I think we must resort to the same methods that we used in the past. We must try, fail, give up, start over again, try, fail again and again until success is finally achieved. If we trace the history of any one of our present industries and see how many difficulties were encountered, we cannot help but be amazed that they were able to develop at all. Until we come to a clearer understanding of these difficulties and of the great necessity for new industries, we are not likely to show any willingness to take the risk and subject ourselves to the inevitable troubles of incubating them.

Just how are industries born and how do they grow? Our industrial history



BY

Charles F. Kettering

Vice President General Motors Corporation

answers this question for us. Starting with an idea, we work with it patiently until it assumes a tangible form. Then without knowing whether the customer is going to want it, or whether he is going to use it, we place the article on the market. The time that elapses between the introduction of a product to the consumer and its establishment on a profit-and-loss basis is a period I often refer to as the "shirt-losing zone." The way its development is handled during this period is a factor which determines whether or not a commercial organization is to succeed. If we attempt to pass through this stage of its development too quickly, we are likely to distribute to the customer large quantities of imperfect merchandise which will be returned. If, on the other hand, we are too cautious and pass through it too slowly, someone else gets ahead. The "shirt-losing zone" has sometimes almost been a "life-losing zone."

I feel that if we tried to raise human children on the same basis as we try to raise industrial children, a baby nine months old would have to be earning its own living. That is the reason why I do

not think we should be too negative toward the WPA, because it is about as good a project as can be invented in so short a time.

Curiosity, special ability, desire to explore—these are the effective motives by which men work. Thinking men are driven by a God-given dissatisfaction with present achievements. Through such men, industries are revolutionized. Even if research workers and their companies were content with the advancements they have made, I doubt if the consumer would permit them to stop their search for new and improved modes of living. Because Americans demand and expect more value, more usefulness from everything they buy; our present needs cannot be considered as an index of our industrial future. There is no way whatever by which we can look at a new industry and tell what it is going to be. Consequently, we can never really plan the future, because we can never see it.

Today we can send a telephone message practically anywhere. At present, the overseas service is interrupted, but ordinarily we can lift the receiver of our telephone instrument and speak to anyone we want. The telephone system in itself is amazing, because only a few years ago we had the trans-continental telephone for the first time. Then radio was developed. No one could have possibly predicted all these developments in communication. At no time in their development could anyone have planned the system we have today.

Some years ago I asked one of the officials at the television studio of the British Broadcasting Company, "Do you think you are going to have much difficulty sending pictures across the ocean?"

He said, "My goodness, you can't do that—I can show you the mathematical limitations on it."

"But," I said, "how do you account for the boy in Nova Scotia who takes photographs of the pictures you send here?"

He replied, "We know all about that. He can do it only when the conditions are very bad."

I cannot help feeling that perhaps he was standing on his head when he looked at the thing, because when conditions were perfect, the range was about fifty

miles, and when they were very bad, it was nearly three thousand. Just such an example provides the basis for my belief that entirely too many research people today want to be the boss. We can set up the experiment, but after that we must abide by whatever it tells us. Something that seems like a logical procedure today may, of course, be entirely out of the question in the future. But whatever the future is like, we must not lose sight of the fact that we cannot avoid getting into it. Tomorrow is going to be tomorrow, and we will have to go along with it or jump off the bridge.

For those young people who will soon be seeking employment in American business, there is one thing that we can write down as a fundamental principle. No matter what kind of future we have, there are still going to be certain things that are important. I think a young man just out of school is very much like an industrial organization. He has his physical equipment, his bricks and mortar, and machines for turning out work. There is still a good demand for them.

We have a fellow in Detroit named Joe Louis, known to some people as the "Brown Bomber," who is an outstanding example of what can be done with physical equipment. There are a number of jobs that pay from ten to thirty-five thousand dollars a year for the person who can throw a ball over a plate in such a way that it will not be where the fellow who has the bat thinks it is. In our present scarcity of toolmakers and other people with highly developed manual dexterities, we find timely confirmation of the fact that physical ability can still command a premium.

Aside from our physical abilities, we have our mental equipment, our ability to think a problem through to a rational conclusion. This equipment, too, is fundamentally important, regardless of the nature of the future. No matter what tomorrow brings, men of ability and men of intelligence are the men who will have the best chance. American industry is cultivating ideas as its richest investment. We are looking for young Marconis, young Bells, young Edisons. We have many of them in our laboratories now. We encourage them. They are taught to look upon progress as a road that has no end.

When young people come to work for us in our research laboratories they inevitably receive two shocks. First, they are shocked when they see what terribly elementary problems we are working on. Then, they are shocked a second time when they discover that nothing they ever learned in college is going to help them; that in spite of our vast technological progress, we know nothing at all about the fundamentals underlying the things we do. If they get over these two shocks,

they are usually very good. They discover that research work is different from production work and that there is really a method in our madness.

For instance, when a young man comes into our organization and sees all the foolish little things we are working on, he cannot believe it is possible. We don't even know why our hands get warm when we rub them together. The young man may say, "Why, that's foolish."

"What do you think makes your hands warm when you rub them together?" I ask.

He says, "It's friction."

Then I say, "Now, what is friction?"

So we argue for half an hour and finally conclude that friction is the thing that makes your hands warm when you rub them together.

We are working on a little thing at Antioch College called chlorophyll in an effort to find out why grass is green. We don't know why it is green. Most people tell us that the color is due to certain quantities of chlorophyll contained in it. Chlorophyll is merely the Greek word for green leaf, and we don't know any more about it in Greek than we do in English. The only good answer I ever heard was from a fellow who takes care of a golf course in Arizona. He said, "I don't know what makes grass green in your country, but out here it's just water. If I don't water these greens, they'll turn brown. So I say it's just water that makes the grass green." Nevertheless, an explanation for that simple little phenomena, the green of the grass, is one of the most desirable things we could have, because the ability of a plant to produce the enormous number of compounds we use for food, clothing, and fuel, is the reason we are here today.

I was browsing through a dictionary of chemical terms the other day and happened to look at the word "protein." The definition ran something like this: "Protein is a word which illy defines a large number of organic compounds containing nitrogen about which very little is known." That is exactly the way I feel about all our future projects. We have just begun to penetrate the field of science; but if we are willing to make a confession of our ignorance, we may still look to the future with the knowledge that we can create as many new products and jobs as are necessary.

I am not ashamed to confess that there are at least a million things about which I am ignorant. A random list of just twenty-five of them would read like this:

1. How can we cure many diseases, such as colds, cancer, and the ills of old age?
2. How do the plants fix the sun's energy?
3. What is friction?

4. What makes glass transparent, metals opaque?
5. How do fuels burn in an engine cylinder?
6. What is magnetism?
7. What is electricity?
8. What is fatigue of metals?
9. What is the nature of light, heat, and other electro-magnetic waves?
10. What is the nature of the molecule, the atom, the electron?
11. What are proteins, carbohydrates, and fats?
12. What are hormones?
13. What are vitamins?
14. How can we use farm products more effectively?
15. What is matter?
16. How do catalysts work?
17. What is solubility, and why are some substances soluble and others not?
18. What is energy?
19. What is the photo-electric effect?
20. What can be done with chemiluminescence?
21. What is a lubricant and how does it work?
22. What does a molecule look like?
23. What are enzymes or viruses?
24. How does the mind function?
25. What is immunity to disease?

This list might have been extended ad-infinitum, because we know so little about anything today. That is the reason we cannot help but go ahead. That is the reason I cannot help but be an optimist.

We have been told many times that unemployment is due to the over-production of new technological products developed by research. It is my contention that we are far behind schedule in our development. To me, research is simply an activity designed to create more jobs, more products, and more opportunities. A new industry may have an effect on older ones and endanger the position of some of the men working in those older industries, but we may rest assured that its effect on the whole of society will be a desirable one. The automotive industry, for example, has created thousands upon thousands of new jobs—many times the number that existed in the horse-and-buggy days. Just one more industry the size of the motor car industry would easily absorb all of our unemployed.

The world is not finished yet by any means; it has just got started. As long as we have the desire to go ahead, we shall go ahead. Never in the known history of the world have we had such technical ability as we have today. The only things we need are optimism, faith, and imagination. Couple these with our technical ability, and we can write our own ticket to the future.

SOUTH AMERICAN TRADE LOSSES

IN previous issues of the MANUFACTURERS RECORD various phases of the existing dislocated world commerce have been discussed, particularly insofar as Latin and South America have been affected and the opportunity thereby presented for United States producers. However, from these separate treatments it may not have been realized the full extent to which these Southern neighbors of ours have had their foreign trade upset by the current war. Export trade losses alone with the axis powers and the countries they now control are in excess of \$571,000,000, or approximately 45 per cent of all exports.

By means of the British naval blockade, the overseas trade of Germany and Italy has been brought to a virtually complete standstill. Similarly, as each succeeding country has been invaded and occupied by Germany, so Great Britain has extended the blockade in order to prevent direct or indirect trade with the axis powers, so that today not only Germany and Italy are unable to carry on trade with South America, but also Poland, Denmark, Norway, Holland, Belgium, Luxemburg and France besides Austria and Czechoslovakia from earlier days. In addition, of course, the trade of Great Britain has been affected also, but to what degree is not at present known.

The cumulative effect of the war on South American trade may be gauged from the fact that the total value of twenty leading commodities exported by Latin American Republics in 1938 to 19 foreign countries was \$1,377,076,000 and of this amount, \$571,232,000 was shipped to Germany, France, Netherlands and Indies, Italy, Belgium, Poland, Czechoslovakia and Denmark. In the case of petroleum, 72 per cent of the total South American output went to France, Germany and Netherlands Indies, 24 per cent of the coffee, 11 per cent of meats, nearly 20 per cent of the copper, 41 per cent of the wool, 42 per cent of the cotton, 40 per cent of metals other than tin and copper, 46 per cent of the hides and skins, 13 per cent of the wheat, 52 per cent of the linseed, 47 per cent of the corn, 19 per cent of the nuts, waxes, oils, chicle and extracts, 51.5 per cent of cereals, 28 per cent of the nitrate, 12.5 per cent of the tin, 19 per cent of the lumber, 24 per cent of the cacao, and 17 per cent of the fibers were exported to these countries now cut off from South America by the British naval

blockade. It is true that in many instances the United States already is the largest single purchaser of these goods and that Great Britain may be purchasing larger quantities than heretofore, but even so it is apparent that a market for these goods will have to be found if South American purchases of United States products are to be maintained or expanded to replace previous purchases from Europe. Recent imports and export figures between Europe and South America are not yet available.

In 1938, the value of twenty Latin American Republics' imports was \$1,467,239,000, of which Germany, France and Italy supplied 22.5 per cent, or \$330,445,000. Total imports in 1939 declined to \$1,336,246,000, yet these three countries nevertheless supplied 18.7 per cent or \$250,333,000. But while this is a decline, it must be remembered that war was in progress during a third of 1939 when exports to Germany in particular fell to an infinitesimal amount; consequently the percentage of exports to these three countries can be considered as having been maintained if not increased during the first part of the year.

Using the latest figures available, the following summarizes the situation in some of the Latin American countries.

BRAZIL

The major commodities of Brazilian exports in 1936, amounting to \$255,973,575, comprised 95.1 per cent of all exports, and of this sum \$53,801,715 was purchased by Germany, Italy, France, Holland, Belgium-Luxemburg, Czechoslovakia and Denmark as follows:

Exports	Value
Coffee	\$23,331,550
Cotton	10,723,900
Cacao	1,320,660
Oil seeds and nuts and vegetable oils	1,585,925
Carnauba wax	466,125
Oranges	431,860
Brazil nuts	231,330
Rice	727,870
Tobacco leaf	2,518,010
Rubber	1,815,110
Frozen and chilled meats	1,361,305
Hides	3,710,575
Skins	176,605
Sheep's wool	2,360,710
Timber and lumber	69,300
Oil seed cakes	2,880,075

In comparison, Brazil's imports of major commodities totaling \$127,899,640 were only 54.5 per cent of all imports (the balance were miscellaneous) and \$25,004,155 of this came from Germany, Italy, France, Belgium-Luxemburg, Czechoslovakia, Poland and Norway as follows:

ARGENTINA

In 1937, Argentina exports totaled \$335,307,035, of which \$145,748,352 went to Germany, Italy, Holland, Belgium, Poland and Denmark as follows:

Exports	Value
Meats	\$ 3,735,112
Hides and skins	7,455,556
Wool	5,332,387
Other cattle industry products	6,165,203
Corn	39,484,677
Wheat	20,429,542
Linseed	20,344,447

Oats	4,316,514
Barley	3,042,025
Raw cotton	1,000,447
Forestry products	2,344,297
Mineral products	1,080,427
Fishing and hunting products	145,545

Against this Argentina imports amounted to \$352,265,632, of which only \$71,609,686 came from Germany, Italy, France, Holland, Belgium and Norway as follows:

Imports	Per Cent Imported from axis-occupied countries	Value
Animal food products	20.8	\$ 379,905
Vegetable food products	23.1	5,690,972
Beverages	34.6	353,167
Textiles and manufactures, total	18.8	14,056,020
Silk and manufactures	63.5	11,880,275
Wool and manufactures	14.1	1,232,714
Cotton and manufactures	17.4	4,805,775
Fibers	4.9	919,060
Chemicals and pharmaceuticals	18.7	4,257,307
Paper and cardboard	15.1	2,790,930
Manufactures of wood	10.3	58,357
Iron and steel, total	44.7	18,900,854
Machinery and motors in general	24.6	3,120,615
Agricultural machinery and apparatus	4.6	373,627
Vehicles	14.7	5,873,635
Other metals and manufactures	14.5	2,418,465
Stone, earthen, glass and ceramics	33.2	3,563,625
Miscellaneous	24.7	4,969,455

<i>Imports</i>	<i>Per Cent Imported from axis-occupied countries</i>	<i>Value</i>
Codfish	8.5	\$ 233,145
Coal and briquettes	39.1	3,493,325
Jute, raw and in yarn	3.7	130,845
Cotton yarn	4.9	85,470
Cotton piece goods	14.2	96,140
Wool yarn	61.0	1,093,235
Wool piece goods	28.2	133,980
Silk yarn	43.6	682,990
Linen piece goods	18.8	420,805
Dyes, aniline or fuchsine	70.2	1,559,195
Wood pulp	35.2	1,284,250
Newsprint paper	31.1	716,485
Iron bars and rods	95.6	1,321,815
Iron sheets for roofs and culverts	19.3	96,030
Rails, fishplates and railway accessories	54.2	1,306,965
Wire	77.4	2,863,245
Tubes, pipes and joinings of iron	60.8	1,710,555
Iron superstructure for buildings	60.5	591,305
Tin plate in sheets	43.1	1,942,710
Motor cars	8.8	964,200
Accessories	11.4	124,685
Inner tubes and tires	11.7	289,740
Sewing machines	36.3	917,125
Electric motors	26.4	110,770
Electric transformers	29.9	273,735
Copper, smelted, rolled or hammered	32.8	686,510
Railway cars and wagons	43.9	709,830
Locomotives	86.2	1,165,010

COLOMBIA

Only nine commodities valued at \$104,620,100 made up 98.8 per cent of all Colombia's exports in 1937, and of this Germany, Italy, France, Holland and Belgium-Luxembourg purchased \$17,105,370 as follows:

<i>Exports</i>	<i>Value</i>
Coffee	\$ 8,753,800
Crude petroleum	4,464,875
Bananas	1,090,775
Cattle hides	2,143,175
Crude platinum	257,600

Leaf tobacco	226,700
Dividivi	158,095
Goat and sheep skins	10,350

On the other hand, a great number of products are considered as major commodities for import, their aggregate value of \$79,776,650 comprising 81.8 per cent of all imports. Of this amount, \$16,658,800 was supplied by Germany, Italy, France, Holland, Belgium, Czechoslovakia, Poland, Norway and Austria as follows:

<i>Imports</i>	<i>Per Cent Imported from axis-occupied countries</i>	<i>Value</i>
Dyed cotton cloth	3.3	\$ 136,850
Cotton stamped cloth	7.9	254,725
Woolen cloth, bleached, dyed or stamped	16.4	362,825
Plain cotton cloth, such as drills, etc.	18.8	404,800
Cotton thread, crude, ready for retail sale	16.4	132,825
Crude cotton cloth known as "bogotanas" percale and Brittany	1.2	12,550
Cotton hosiery	60.8	236,325
Woolen hats, unblocked and forms	84.8	324,875
Men's felt hats, ready for wear	28.0	152,375
Radio receiving sets	20.8	143,175
Dredges and accessories	0.4	5,175
Knitting machines and accessories	11.8	231,725
Ice boxes and refrigerators	0.7	3,450
Sewing machines	15.2	83,375
Iron and steel tubing of more than 5 centimeters in diameter	16.6	332,350
Iron and steel tubing of less than 5 centimeters in diameter	17.7	91,425
Barbed wire	51.8	422,675
Galvanized iron and steel wire	44.4	142,025
Accessories for piping, other than keys and meters ..	6.5	18,400
Hatchets, axes, machetes, etc.	45.7	146,625
Tools for arts and crafts	39.5	163,300
Other metallic manufactures	29.8	1,671,770
Transportation materials, total	4.5	315,000
Quinine and its salts	78.2	286,925
Biological and opotherapeutic products	79.5	420,325
Injectants, not relative to biological products	85.8	303,600
Pharmaceutical specialties in form of tablets, pills, capsules, etc.	68.5	725,650
Pharmaceutical specialties in form of solutions, emulsions, sirups	43.8	154,100
Other chemical products	45.1	1,405,300
Beverages, wines, liquors and vinegar	28.3	282,325

(Continued on page 58)

Largest All-Welded Steel Laddes for the South

Eight all-welded steel laddes with a capacity of 190 tons of molten steel—the largest of their kind ever made—have recently been placed in operation in the open hearth department of the Bethlehem Steel Company's Maryland plant, Sparrows Point.

The performance of 35 laddes of the same construction, although somewhat smaller in size, 135 tons each, is ample guarantee that all-welded laddes can be used with perfect safety. Some of these laddes have been in continuous service for seven years and not a single failure has ever occurred.

Manufacture of all-welded laddes calls for extreme care in design and fabrication and requires skilled and highly experienced welders. Adequate equipment for best treating is absolutely essential as the completed laddes must be stress relieved at 1150 to 1250 degrees F.

The weight of the 190 ton laddes, including stopper rigging, is 58,300 lbs. Estimated weight of the brick lining is 50,500 lbs., making a total weight including the hot metal of 489,600 lbs. (assuming 380,800 lbs. of metal). They are replacing riveted laddes of conventional construction, of 168 tons capacity, weighing 96,000 lbs. without brick lining. This makes a saving of 37,700 lbs., or 18.9 tons, which roughly figured offsets the increase in live load of 22 tons of molten steel, and eliminates the necessity for increasing the capacity of cranes, hooks, and run ways.

The new laddes are of elliptical design and have the following dimensions: Largest diameter, 15 ft. 6 $\frac{3}{4}$ in. at top, 12 ft. 4 $\frac{3}{16}$ in. at bottom; smallest diameter, 12 ft. 2 in. at top, 9 ft. 4 $\frac{3}{16}$ in. at bottom; overall depth 12 ft. 9 $\frac{1}{2}$ in.; center to center of lifting hooks, 13 ft. The two trunnions are 13 in. in diameter and are made of special forged steel, normalized and annealed for 70,000 lbs. per sq. in. tensile strength, 40,000 lbs. per sq. in. yield point and consistent ductility. The shell plate is 1 $\frac{1}{2}$ in. thick, and is made in two halves, butt-welded together with a vertical, double V-weld.

The laddes were fabricated at Bethlehem's Steelton plant, where furnaces for heat treating work of this size are available. However, as the finished laddes were too large for shipping, it was necessary to make them in two sections, a top section 9 ft. 6 in. high, and a bottom section 3 ft. 3 $\frac{1}{4}$ in. high. Even then it was necessary to go to special routings in shipping the laddes to the Maryland plant.

At the point of destination the two sections were riveted together with a horizontal splice band 22 in. wide. Riveting was used instead of welding because no heat treating furnaces large enough to handle the laddes are available at the Maryland plant.

RICHMOND'S DEEPWATER TERMINAL

BY

Edmund Brill

Chamber of Commerce,
Richmond, Virginia

RICHMOND'S Deepwater Terminal now in the final stage of completion is the realization of a 150-year-old desire of this city to obtain the physical facilities necessary for making it one of the nation's leading inland ports.

Cut-off canals, eliminating hazardous bends, have been completed. The river has been deepened to accommodate ships up to 650 feet long and drawing not more than 25 feet of water. A 1,250 linear feet wharf wall has been completed, and the turning basin is ready while two fire-proof warehouses with 187,000 square feet of storage space are almost finished building.

Up until this time Richmond has had an Intermediate Terminal, which it has outgrown. Warehouses there have long been crowded and it has been necessary to rent additional storage space in various sections of the city. The new warehouses with approximately five acres under roof will take care of all the shortage in warehouse facilities.

The Deepwater Terminal is far more than a hopeful dream of Richmonders who simply would like to see their city grow and prosper. It has sound business and years of study behind it. In the first place, the constant increase in tonnage and value of shipments arriving at the outgrown intermediate terminal, which the city enlarged and improved as recently as 1938, gives tangible evidence of what will result when even better facilities are available. In the second place, informed port and shipping officials believe that a port reaching far inland from the Atlantic Coast will provide a form of transportation not only necessary for Richmond but for the vast mineral, timber, industrial and other regions of Virginia and for other states.

The Committee on Resolutions at the Atlantic Deeper Waterways Association's 27th annual convention in 1934 stated:

"By reason of its strategic location, the importance of the area intersected by it, and the further fact that the navigable portion thereof extends to the capital

City of Richmond, and the unusual facilities for navigation from the mouth of the river through Hampton Roads to the ocean, the James River has always been regarded as worth of improvement and susceptible of a large commerce. We anticipate that after the provision of an adequate channel, a large coastwise and overseas commerce will develop."

Negotiations are underway with the rail carriers regarding physical connections to the new terminals that will provide Richmond with the same advantages now enjoyed by other port cities in the matter of freight rates and absorption charges so that Richmond's industries, as well as its consumers, may participate in the savings of thousands of dollars annually as the result of lowered transportation rates, both water and rail.

The Terminal and the removal of the present freight tariff walls from Richmond will, in the opinion of Gamble Bowers, director of the Richmond Department of Public Works, "unquestionably expand our present trade area, enlarge our industries, increase our production, increase our employment opportunities and bring about a community growth to an extent not possible through any other means at our disposal. We feel confident that our port development will not only be successful as a port, but in addi-

tion, it will be the means primarily of successfully advancing Richmond's industrial and commercial growth and prosperity."

In 1927 the City Council created the Richmond Port Commission in order to secure further improvements in the James and to obtain larger terminal facilities here.

Director Bowers, who was Assistant Director of Public Works in 1934, studied the activities of the Commission and made the following report during that year:

"The Port Commission was successful in obtaining the Federal Government's adoption of a cooperative project which authorized an expenditure of \$4,500,000 so as to provide a channel 25 feet deep and 300 feet wide from the mouth of the river at Newport News to City Point, a distance of 70 miles; thence a channel 25 feet deep and 200 feet wide, via the cut-off route through Turkey Island, Jones Neck and Dutch Gap-Aiken Swamp, from City Point to the proposed Richmond Deepwater Terminal located 3.8 miles below the corporation line, and a channel 18 feet deep and 200 feet wide from the proposed deepwater terminal to the head of navigation at the Richmond Lock Gates.

Although Congress made no direct ap-

ESTIMATED COST

8 miles rail connections and yard tracks	\$190,000
Turning Basin—1,725,000 cubic yards	345,000
1,250 linear feet Wharf Wall	470,000
2 combination Transit Sheds and Warehouses, 187,000 sq. ft. floor area, Sprinkler System and fireproof	434,000
Office and Utility Building	35,000
Electricity and domestic water supply	25,000
Paving warehouse area and apron	36,000
Freight handling equipment	92,000
Storage Tanks	45,000
Engineering, miscellaneous and contingencies	78,000

Sub-Total

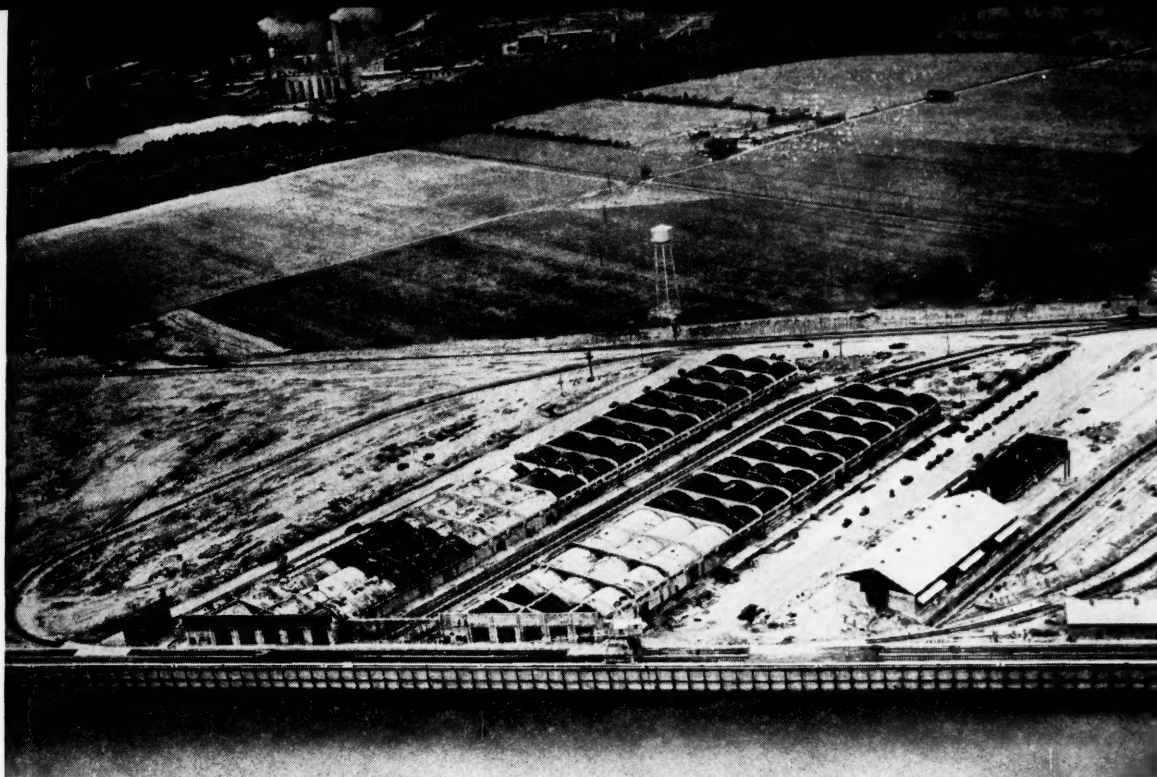
\$1,750,000

Grading and Drainage	\$311,000
4 miles Primary State Highway	240,000
Land	175,000

Total

\$2,476,000

This terminal cost does not include any other part of the James River Improvement Program. The total improvement program represents an investment of more than \$6,000,000.00.



Richmond Marine Terminal in the final stage of completion. Back of the 1250-ft. concrete wharf-wall are the two warehouses, bulk storage building and office building. In the background is the E. I. duPont de Nemours cellophane and rayon plant.

propriation for construction, its decision proved an important step in the future development of the James. The War Department, which had the authority to allocate funds for the river, began work in 1931 and completed in that year all channel improvements to full project depth and width in that section of the James between its mouth and City Point, a distance of 72 miles. In 1932 the City acquired and transferred title to the Government all necessary rights of way and spoil disposal areas for channel deepening and straightening, including that necessary for three cut-off canals. Richmond, in addition, spent considerable money improving and enlarging its intermediate terminal facilities.

Then followed work on the cut-off canals which shortened and straightened the river at strategic points. The first—across Aiken Swamp—was completed on November 1, 1933; the second—across Turkey Island—was opened to navigation September 1, 1934, and the third—across Jones Neck—was finished October 1, 1937. The three cut-offs shortened the length of the navigable channel almost 11 miles and reduced the maximum freshet heights at this city.

Even before these canals were completed business increased on the James River, as a result of the channel and terminal improvements which the Federal Government and the City of Richmond made at a cost of approximately \$2,250,000. From 1924 until 1933, inclusive, the total river commerce increased from 789,500 tons to 1,333,700 tons, or approximately 69 per cent.

"This was accomplished in spite of a general decline in practically all lines

of business endeavor and within a period of world-wide depression," said Director Bowers.

In 1933 the City opened its enlarged Intermediate Terminal at the foot of Nicholson Street, and shortly afterward the first foreign ships since the days of the old sailing vessel arrived at the Richmond harbor. There were 12 of them that year, loaded with Cuban refined sugar. Chief commodities moved through the port include sugar, petroleum products, brick, sand and gravel, manufactured fertilizer and fertilizer materials, scrap iron, steel billets, forest products, canned foods, ammunition, sulphuric acid, agricultural products, tobacco and paper.

Official records show that as the river improvement program progressed, the total tonnage continued to increase. In 1934 the figure was 1,873,471 tons. The year 1935 brought a minor decline, the tonnage amounting to 1,771,033, but in 1936 it hit a high of 2,094,005. This mark was surpassed, however, in 1937 (2,242,335 tons), 1938 (2,357,313 tons) and 1939 (2,820,168 tons).

These figures represent the total river tonnage, whereas Richmond harbor, which handles more than half of all the tonnage and approximately 70 per cent of the value of the James River cargoes, has recorded tonnage increases annually since 1932.

The Intermediate Terminal is composed of the City Wharf, Richmond Dock

and numerous privately owned wharves. The City Wharf is 758 feet long and has warehouse and transit shed facilities adjacent. The Richmond Dock is 3,450 feet long, and there is a total of 4,570 linear feet of wharf frontage in the harbor. A five-ton electric gantry crane is available for handling cargoes between the ship and the terminal building, and there are railroad connections to both the warehouse and the wharf.

With the Intermediate Terminal outgrown there is a real need for the facilities provided at the Deepwater port.

In discussing the physical layout of the Deepwater Terminal, perhaps the first question which comes to mind is "Why was a site chosen which is 3.8 miles from Richmond's corporate limits?" There are two important reasons. First, there is solid rock in the river bed 18 feet below mean low water from the City Lock Gates to the point that engineers selected for the new harbor. The cost of removing these rocks would have been excessive. The second reason involves the future of the Port. As already stated, the channel will be 25 feet deep, yet it is possible to have an even deeper canal from the Terminal to the mouth of the James if business should warrant such an undertaking. In addition, the area is undeveloped, which means there is an abundance of room for expansion. The site, lying between U. S. Highway Number One and the river, also is in proximity to the principal highways and railroads. Thus, the builders are planning for tomorrow as well as giving Richmond adequate port facilities for today.

The cost of the Deepwater Terminal, exclusive of grading and drainage, State

(Continued on page 60)

MATERIALS NEEDED FOR DEFENSE

PART I

In the June MANUFACTURERS RECORD was printed a summary, by states, of the South's mineral resources (principally essential materials though some strategic and critical items were also included) which could be called upon for national defense or in the prosecution of war.

The following article deals with the complete list of all strategic and critical materials, mineral and otherwise.

Strategic items are those essential to national defense, the supply of which being dependent, in whole or in part, on resources outside the United States.

Critical materials are those essential in a lesser degree or are available in more adequate quantities in this country.

It should be borne in mind that many of these materials of both classes which are important are not produced in the United States and while substitutes are known or being pursued for such use as can possibly be made of them, times of emergency create demands far in excess and far more rapidly than ordinary production and consumption is geared to or capable of relinquishing. Furthermore, not a few of these materials are unobtainable, for one or more reasons, from any other source than that now employed. Others are of a perishable character thus circumventing the possibility of any large storage.

In comparison with the list of materials similarly classified during the last war, the present list is comparatively small, due almost entirely to the ingenuity of United States manufacturers with their vast research programs. As indicated above, some substitutes already are known or being perfected, but as long as we have a list of strategic and critical materials those products remain for American producers to find substitutes for them. This is a challenge of major proportion because the uses to which these materials are put are not only varied but highly exacting and frequently demand the presence of divers characteristics not all of which are always present in substitutes while just as often the synthetic product contains characteristics or properties of a counter kind. Ed.

ANTIMONY

Antimony is used in storage battery plates, bullet alloys, type metal, cable covering, babbitt, and other bearing metals. Most of it is used in alloys, chiefly with lead.

The major part of the United States supply comes from Mexico and Bolivia. In 1938, United States imports totaled 9,143 tons or almost one third of the world's production. In addition, 650 tons were domestically produced—a small quantity being derived from Arkansas.

The only primary antimony smelter in this country is located at Laredo, Texas, and operates almost wholly on Mexican ores.

CHROMIUM

Chromium is one of the important industrial elements for the supply of which this country is almost wholly dependent upon imports from foreign sources. Chromite is the only mineral commercially important as a chromium ore. Its chief uses are as an alloy for steels (stainless steel contains 18% chromium as a rule), and other metals. In addition, chromium chemicals are used in leather tanning, the manufacture of pigments, and in electro-plating while for many uses of chromite there is no satisfactory substitute. In 1938 United States imports totaled 352,085 long tons of chromite whereas domestic production amounted to only 812 long tons. This importation was approximately one third of the world's total production and came principally from Southern Africa, the Philippines, New Caledonia, Cuba, and Turkey. Three fourths of the world's supply of chromite comes from five countries: U. S. S. R., 20 percent; Southern Rhodesia, 17 percent; Union of South Africa, 16 percent; Turkey, 15 percent; and Cuba, 7 percent. Cuba is the only important source of ore in this hemisphere and its grade is such as to limit its use for refractory purposes and cannot be employed for making ferrochrome—the essential ferro alloy used in steel manufacturing.

COCONUT SHELL CHAR

Charcoal made from coconut shells has long been considered the best absorbent filler for gas mask cannisters. Gas masks are vital necessities in time of emergency and the quantity required for military use will be considerably increased by the supply needed for the civil population. However, such progress has been made in the development of substitutes that it is believed large scale production of an entirely satisfactory non-coconut charcoal

for gas masks will be available within the next year.

MANGANESE, ferrograde

The steel industry requires ore of a metallurgical grade containing *not less than* 48 percent manganese for the manufacture of 78-80 percent ferro-manganese, the alloy used in making steel where it serves as a deoxidizer and purifying agent, and as an alloying element for special purpose steels. Approximately 14 pounds of manganese are used to produce every ton of steel in this country.

The principal producing countries, and those from which United States imports are derived, are Russia, British India, the Gold Coast, Union of South Africa, Brazil, and Cuba. In 1939 we imported 698,490 long tons of manganese ore, having an average content of 48 percent while imports during the first four months of the current year amounted to 404,821 tons. It has been estimated that a year of full capacity steel production, as would be required in any major war effort, would require about a million long tons of ore. Brazil and Cuba, the principal producers in the western hemisphere, are not equipped to supply more than a part of this country's needs.

In 1938, 5,356 long tons of manganese ore containing 35 percent or more (averaging 48 percent) manganese were shipped from domestic mines, principally in Arkansas, Georgia, Tennessee and Montana, though some production was reported from Alabama, Virginia and Utah. During the first four months of 1940 however, domestic production rose to a total of 18,400 tons.

In the United States are large quantities of manganese, but relatively little of it is of a grade or Mn content suitable for steel manufacturing.

MANILA FIBER

Manila fiber comes from the leaf stems forming the trunk of the abaca plant. The entire world supply of high grade abaca is centered in a few provinces in the Philippine Islands, and 75% of our imports comes from one province, Davao, in Southern Mindanao. There is no satisfactory substitute for this fiber in the manufacture of marine cordage, oil well cables, and construction work. Of all ropes, manila has the greatest tensile strength, the highest resiliency, possesses the longest life and stands up best under all conditions, including wetting without

any appreciable shrinkage or swelling. Any substitute would have to fulfill these requirements. There is no manila fiber produced in the United States, but experimental growth of abaca in Central America has advanced to the point where the high cost of labor as contrasted with the Filipinos is all that has held up commercial production. This is being overcome by development of mechanical methods of stripping the pulp from the fiber. Over 45,000 tons of manila fiber were imported into the United States in 1939.

MERCURY

Mercury (or quicksilver) is virtually indispensable for military and civil uses ranging from the source of manufacture of fulminate of mercury for detonating high explosives, drugs, paints, production of gold, disinfection of seeds, generation of power from mercury boilers, and mercury vapor lamps to the manufacture of felt.

Normally, the United States consumes about 30,000 flasks annually of which approximately half is imported, for while this country is the world's third largest producer it is also by far the largest consumer.

The major source of mercury is Spain and it is reported that that country's 1940 output has been obligated at an estimated price of \$200 per flask compared to the current world price of approximately \$180 and previous annual value of less than \$100.

While domestic production has continued to increase (1,800 flasks in January, 2,200 in February, 2,500 in March, and 2,700 flasks in April, 1940), consumption has tended to decrease since the beginning of the current year. The cartel price of \$205 plus \$19 for duty as compared with \$178-\$182 for domestic mercury, doubtless has had a deterring effect on reduced imports.

During 1917-18 this country's average annual consumption increased 35 percent above that of the previous three years, consequently it is permissible to infer that in the event of war a similar increase could again be expected beyond the preceding high year.

The use of substitutes which have been developed, especially lead azide in place of fulminate of mercury, will undoubtedly ease the situation, but there still remain many uses for which mercury has no substitute.

At present Arkansas and Texas are the only southern states producing mercury.

MICA

World production of mica may be segregated into two main classifications, block mica comprising slightly over one quarter of the total, and waste and scrap mica constituting the remainder. Of the

latter the United States produces approximately four-fifths or more than 20,000 tons. As a result of this large production and the still larger deposits in this country, considerable misunderstanding has arisen. *Therefore it should be clearly understood that no shortage is likely with waste and scrap mica and it is not classified as strategic.* This particular kind of mica is usually ground, either wet or dry, for use in rubber, paint, wallpaper, roofing material, electrical insulation and numerous other uses.

Block mica, with a total world production of about 9,000 tons comprises some 6,000 tons of splittings and 3,000 tons of sheet. Of these two varieties, nearly 5,500 tons of the former and 600 tons of the latter are definitely strategic and the United States produces only 75 tons of sheet. Of splittings used for armature winding-tape, commutator segments, rings, cones, transformers and high tension magneto condensers, the United States produces none. Most of it comes from British India with a small quantity from Madagascar and a very few tons from Canada. Sheet mica, on the other hand, though produced in much smaller amount, comes from 14 different countries and is used for condensers, trimmers, high grade spark plugs and radio tube bridges.

While, as already pointed out, there is no shortage of the variety of mica usually produced in this country and particularly in the South, it is likely that an increased demand will be made upon domestic sources and it is important for producers to make available the best material they can manage. It cannot be overemphasized that the grading and classifying of sheet mica is extremely complex and at least 100 distinct products can be classed as unmanufactured mica. Not only do the sheets vary enormously in size but there are not less than six different qualities ranging from clear to black stained. The Minerals Yearbook for 1939 states that a product, alsifilm made from bentonite may compete with mica in the electrical field, if it can be produced commercially. Bentonite is produced in at least four southern states and is available in others.

NICKEL

Nickel's most important use is as an alloy in steel to give it hardness, toughness, and strength. It is also used as an alloy in copper, silver, and aluminum. Strictly military uses are for armor plates, armor-piercing projectiles, gun barrels, recoil cylinders, etc. Over 85% of the world's supply is produced in Canada. In 1938 the United States produced 2,716 tons of nickel, part as a by-product of electrolytic refining of copper and the rest secondary nickel recovered from scrap. This is insignificant when compared with our consumption of 22,400 tons, of which 80% came from Canada. Of the three

principal types of ore, only sulphide and silicate are important.

QUARTZ CRYSTAL

The quartz crystal which is meant when spoken of as a strategic material is that particular crystal form having piezo-electric characteristics. These crystals are used for radio frequency control, and must be optically clear, have growth lines on three sides, and be free from flaws, cracks, ghosts, phantoms, veils, needles, bubbles, and twinning. There is no present domestic production of quartz crystal of a quality for use in radio equipment, but the United States does have the machinery necessary to do the highly technical task of cutting the radio crystals from the mother crystal. Only a small percentage (about seven tons) of the crystal produced, even in Brazil which produces almost all of it, is suitable for radio use. Other uses with less strict specifications include electrical apparatus, pivots and laboratory vessels.

QUININE

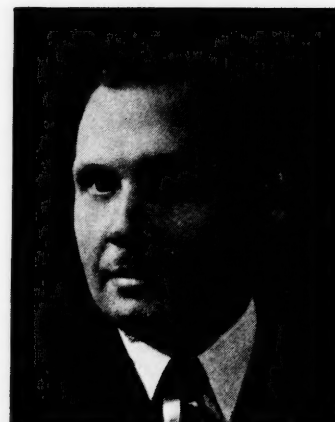
Quinine is the best known, most generally accepted and used specific for the prevention and treatment of malaria. Although two synthetic compounds, atabrine and plasmochin, have made great strides in malaria treatment, neither has completely displaced quinine. The world's cultivated production of Cinchona bark, from which quinine is derived, is in the Dutch East Indies. Various attempts have been made to grow Cinchona bark elsewhere, but as yet these have been unsuccessful as far as making a dent on the world market is concerned.

RUBBER

The United States' rubber manufacturing industry had a total output valued at \$883,000,000 in 1937. Approximately 97 percent of the output of crude rubber comes from the Middle East, with 52 percent coming from Malaya and other British possessions, and 33 percent from the Netherland Indies. There are a few American companies having plantations in various parts of the world, but they supply only 6 percent of this country's requirements. South American rubber production is low, largely because of the South American leaf disease, and although it is reported that this is being overcome, there is little likelihood of this hemisphere's supplying any great share of the rubber demand in the next decade. Certain synthetic rubbers have been developed in this country, but domestic production is small, and it would be some while before the American synthetic rubber industries would be in a position to supply even the minimum demands of the country. Rubber is indispensable in the manufacture of motor vehicles, airplanes,

(Continued on page 60)

THE POSSIBILITIES OF A DOMESTIC ESSENTIAL OIL INDUSTRY



BY

Dr. Paul Kolachov,

*Director of Research,
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Louisville, Ky.*

THE planned cultivation in the South of coriander, caraway, anise, fennel, angelica and licorice, not only would find a ready market in the United States, but would break up the large tracts of surplus-producers and rehabilitate the small farms. Such a program would fit in well with the current effort to reduce cotton surpluses by the planting of flax, castor beans, soyabeans, sweet potatoes, artichokes, and tung oil trees. The methods of production of these materials in Europe today are almost the same as they were years ago, for there has been no real scientific attempt at control of quality.

At the present time the United States is taking first place in consumption, and is spending a great deal of money to import aromatic seeds, roots and essential oils from abroad, while the consumption of essential oils has been increasing yearly throughout the world. This article is written for the purpose of showing the possibility of a domestic essential oil industry and the importance of such an industry to the United States.

This country, for example, has made large expenditures for cosmetic and perfume articles, as the following figures illustrate: before the first World War the United States spent \$25,000,000 for these products; in the last decade the total expenditure increased to two billion dollars a year, which is equal to the annual consumption of electrical energy. Such an enormous increase of consumption brought in its wake the development of plantations for various aromatic plants throughout Europe and Asia, but not in the United States.

A few figures will indicate the importance that this industry has acquired in different countries. France, for example, produces close to 7,000,000 pounds of orange flowers per year and 5,000,000 pounds of oil of rose petals per year;

Morocco produced in 1900 half a million pounds of oil from jasmine and in 1930 approximately 2,000,000 pounds; Spain produces a total of 1,000,000 pounds of essential oils which are chiefly from fennel, anise and citrus; Italy produces mostly oil from citrus plants amounting to \$5,000,000 yearly. The famous oil of rose which is produced in Bulgaria has a market value of over \$3,000,000 a year. England produces a total of 15,000 pounds of essential oils per year and the more expensive oil, mint, which has established a world reputation for itself and sells at the high price of \$17.50 per pound. The cultivation of coriander in Russia in 1917 was slightly over 1,000 acres. Statistical data show that in 1932, 250,000 acres of coriander were planted in Russia. Japan, China, Australia and many islands have greatly increased their production of essential oils in recent years. Total production of essential oils in the world is considered to be over 50,000,000 pounds a year with a total value of over a quarter billion dollars.

Seeds and roots from aromatic plants and their essential oils are used as flavors and odors in the food industry, the cosmetic and perfume industry, the pharmaceutical industry and the distilling in-

dustry. They also are used as bactericides.

In the rectification of essential oils the resultant higher alcohols, esters, aldehydes, ketones, etc., obtained are used as ingredients in synthetic mixtures. The synthetic essence industry, therefore, provides another open field for cultivation of aromatic plants.

The United States uses enormous quantities of all these aromatic plants and essential oils. Yet out of one hundred known principal variations of the aromatic plants produced, only two are cultivated in this country—mint and citrus—and of secondary importance, apricots, peaches and almonds. We shall take only a few varieties of these plants and show the quantity which the United States buys and the amount of money expended in purchasing this material from abroad.

The following table is derived from the government records of the U. S. Department of Commerce.

1937 IMPORTS			
	Quantity, pounds	Value, dollars	Essential Oils Quantity, pounds
Coriander seed	3,000,000	\$150,000	unknown
Caraway seed	6,000,000	400,000	unknown
Anise seed	550,000	45,000	300,000
Fennel seed	300,000	18,000	250
Angelica seed			
and root	60,000	10,000	unknown
Licorice root, ex-			
tract in paste, rolls			
or any other form..	72,000,000	1,500,000	
1938 IMPORTS			
	Quantity, pounds	Value, dollars	
Total of spices	120,000,000	\$12,000,000	
Total of essential oils	3,000,000	2,000,000	

MANUFACTURERS RECORD FOR

Geographic, soil and climatic conditions in the United States admit the cultivation of aromatic plants over wide areas with a promise of high profit. No elaborate equipment is required; the standard agricultural implements are applicable to the cultivation of aromatic plants.

For the purpose of illustration we shall select only six varieties and show in what longitudes and latitudes they could grow in the United States and under what climatic conditions in the various sections of the country.

	longitude	latitude
Coriander	76°E-135°W	10°S-65°N
Caraway	1°W-153°E	10°S-57°N
Anise	105°W-43°E	54°S-54°N
Fennel	1°W-72°E	25°S-50°N
Angelica	12°W-72°E	39°S-60°N
Licorice	10°W-67°E	36°S-70°N

CORIANDER *Coriandrum sativum*, L. *Umbelliferae*

Coriander grows satisfactorily in the United States from Florida to Maine and from New York to California. Successful experimentation has been carried out in Kentucky and Illinois. Coriander grows in almost any soil except ground with swampy drainage. The best growth sites are considered to be either a black or rich limy soil. It requires sunny locations. In the shade, an excess of humidity may affect adversely the health of the plant. Optimum growth may be accomplished either on fallow land or following perennial herbs in the practice of crop rotation. The plant does not thrive very well on soft and weedy lands. In a crop rotation, the best time for coriander is after any year-round plant, such as rye and wheat, and also after such legumes as potatoes. Very often coriander is sown with caraway seed. The harvesting of caraway crops takes place every second year, while coriander is harvested annually, usually prior to caraway when there is a double crop.

CARAWAY *Carum carvi* L. *Umbelliferae*

Caraway grows from the southern region to the northern region, but particularly well in the South. The method of cultivation is similar to that of coriander. The plant grows best on a damp and flat ground. Exhausted or weedy lands are not suitable for caraway.

ANISE *Pimpinella anisum* L. *Umbelliferae*

The cultivation of anise is preferably in the Southern states. Anise thrives best in a rich limy soil, black with humus and free from weeds. The climate should be warm and dry. Because the vegetation period is long (130-140 days), anise is sown before all other plants. This is one reason for its cultivation in warm climates.

FENNEL *Foeniculum officinale* L. *Umbelliferae*

Fennel grows from the Southern region to the northern region, but particularly well in the South. The best soils for fennel are black-sandy and sandy clay soils with sufficient lime and not too damp. (Too much moisture develops commercially undesirable parts of the plant.)

ANGELICA *Archangelica officinalis* Hoffm. *Umbelliferae*

Angelica grows everywhere in humid places, in stagnant pools, lakes and rivers. The plant originated in the Southern countries and now is spread over all Europe and Asia.

LICORICE *Glycyrrhiza glabra* L. *Leguminosae*

The Southern states are preferable for growth of licorice as the most suitable soil for licorice is clay. Experimental work on licorice cultivation carried out in Louisiana and California has proved quite successful. Licorice would be a very profitable crop for the Southern states.

To emphasize the profitable production of aromatic plants, we shall compare the cost of production of corn and cotton and a few varieties of aromatic plants such as coriander, caraway, anise, fennel, angelica and licorice. Cost of production in the following table includes for corn, labor and power, manure and fertilizer, land rent, and other costs; for cotton, rent, land preparation, fertilizers, seed, planting, cultivation, picking, ginning, and miscellaneous; for aromatic plants, the extra expenses from weeding are included.

	Cost of production per acre	Yield, per acre (average)
corn	\$16-18	40 bu. (56 lbs. = 1 bu.)
cotton	\$16-17	250 lbs.
coriander	\$25	1500 lbs.
caraway	\$25	1000 lbs.
anise	\$25	1800 lbs.
fennel	\$25	1200 lbs.
angelica seed	\$25	600 lbs.
angelica root		
licorice root	\$30	2000 lbs.

*Whole. **Peel. †Cube cut.

The present price of aromatic materials such as seeds and roots and essential oils has doubled and in some cases even tripled.

	Oil from 100 lbs. seed	Wholesale price per lb.
coriander	0.5-1.0 lb.	\$12.50
caraway	3 lbs.	3.25
anise	2.5 lbs.	3.50
fennel	5 lbs.	2.25
angelica seed	0.75-1.0 lb.	48.00
angelica root	0.3-0.5 lb.	68.00
licorice root ¹	(resinol) 2.50	

¹Production of essential oil from licorice root is not in commercial practice; only the extract and resinol are prepared.

After distillation of these materials for essential oils, the seeds contain considerable amounts of butter-fat and protein. This residue could be utilized profitably as cattle and chicken feed.

In order to supply the demand comparable to that for roots, seeds and essential oils of the United States industry in 1937, the following acreages would be necessary:

	Acreage (average crop)
Coriander	29,000
Caraway	7,000
Anise	12,500
Fennel	300
Angelica	1,000
Licorice	50,000
Total	99,800

These materials yield a higher profit than any other crops in the United States. Furthermore, one hundred thousand acres is no inconsiderable agricultural area, especially in the South where the problem of overproduction in cotton and other staple crops must be met. For the last six years in dealing with the European sources of supply of these materials, the author found that the quality is poor. Accordingly, experimental cultivation was tried in America. From the results of this experimentation the author is thoroughly convinced that these six varieties could be grown in the Southern states with a better quality and uniformity of material.

These considerations show clearly the possibility of a domestic essential oil industry which would result in a profitable enterprise. The Southern states with their enormous acreage of free land and

	Farmer's price	Total return per acre	Market value
corn	\$0.50/bu.	\$20	\$0.01/lb.
cotton	0.08/lb.	\$20	0.10/lb. Dec. 1937
coriander	0.08/lb.	\$120	0.09/lb.
caraway	0.09/lb.	\$90	0.09 1/2/lb.
anise	0.10/lb.	\$180	0.12/lb.
fennel	0.09/lb.	\$108	0.12/lb.
angelica seed	0.22/lb.	\$132	0.25/lb.
angelica root			0.75/lb.
licorice root	0.05/lb.	\$100	0.06/lb.* 0.13/lb.** 0.24/lb.†

comparatively low cost of labor present unusual opportunities for this cultivation. In conclusion the advantages of the proposed industry may be summed up as follows:

1. Utilization of idle lands in the South.
2. Increased employment.
3. Establishment of a domestic source of supply to satisfy the large United States demand.
4. Increased remuneration for farm products.
5. Replacement of surplus of staple crops by new crops.

THE ONLY WAY FORWARD!

NO education, science or philosophy can change established law one iota.

We can fly, but gravitation remains the same. Science can pour into our laps all kinds of modern marvellous achievements, but every natural law since Adam remains exactly the same, unchanged.

A man must still get muscle like a mule. You can't buy muscle, mind or morality.

The laws governing intellect remain a psychological fixture. Science cannot circumvent them. The same unchanging physiological laws govern animal life. Science is only successful when it discovers, and obeys, these laws in its onward march.

Similarly, the Ten Commandments remain and will continue forever the fundamental laws of all decent living as long as men live.

Nothing but high ideals and hard work can lift a man or nation to happy, healthy altitudes.

Murder is still murder. Adultery is still adultery. Stealing is still stealing. Lying is still lying.

Right is still right. Wrong is still wrong and success can only be found on the right road.

The secret of success in all life is the discovery and obedience to these laws, always and everywhere under all conditions and relations of life.

Thrift has always brought its reward and always will.

Prodigality has always brought its punishment and always will. And it should be so. Otherwise what sort of world would this be?

To adjust one's self to these unchanging laws is life at its best. It is, of course, necessary to adjust one's self to rapid changes in the world, but it is far more essential that we adjust ourselves to the unchanging. To defy these laws is life at its worst.

Millions of boys and girls, men and women, venture rebellion to the laws of life to a degree that is not far enough to put them outside the pale of good society or get them in jail, but far enough to keep them a liability to others and constant trouble to themselves.

These laws not only apply to the individual but to society as a whole. The social order must obey or we have oppression, rebellion, class clashes, and upheavals of all sorts.

The government must be under law or it can be the greatest transgressor of all that undertake to defy what is essential for the best interests of the individual, society and the nation.

These laws of life begin with the individual, of which society is made.



BY

Dr. John J. Wicker

President, Fork Union Military Academy, Fork Union, Va.

Without the unit you have no parts with which to build a social order. The more units of the right kind you have the sooner and securer will be the correct social order.

You just can't arbitrarily do anything. All are under a constitution established in nature before man or society ever came into being.

There are only two roads: Repression, which means dictatorship. This form of government has largely ruled the world through its autocrats. Such government has centered in emperors, czars, kings and potentates, and today in dictators. Of necessity it is a government of force from without, repressive and oppressive. To maintain such governments, armies, navies and police powers have been absolutely essential, and until recent years ignorance was the handmaiden and servant of these autocracies.

Dictators believe that under such rule men make the best citizens when they are kept incapable or, if capable, forbidden to speak. This form of government, semi-civilized, emerged from the jungle. Much of Europe has fallen heir to this tyranny, the key-note of which is absolutism and the enslaving of men's minds.

Strange to say, the university in Germany has become the right arm of this sort of government and has added its scientific power to military force for the glory of dictatorship.

A strange psychology has permeated

the people and they have surrendered themselves and all that they possess to the egotistic call of dictators who have no humanitarian impulses and live only to serve and seek to satisfy their own godless ambitions.

The other alternative is Expression. Democracy is the only atmosphere for a free people. The dictator says "Thou shalt not think, thou shalt not speak." Democracy says, "You must think, you must speak, you must exercise your individual responsibility or you can never become a free man."

Today repression and expression are locked in deadly combat. All the sympathies of our country are with the remaining democracies. We, however, have our own problems. Our country is homogeneous and yet heterogeneous. Immigration from all parts of the world has made it so. We need have little fear from without, but we must purge our land from within. If Denmark, Norway, Holland and possibly Belgium and France had taken this precaution they would not be prostrate today.

Believe it or not, all over our country there is a Fifth Column and we must encourage every possible investigation, discovery and explanation of those who would destroy our individual freedom and initiative which constitute the foundation of our democracy.

The Fifth Column does not wear a uniform or display a flag. It works silently. It gets in the atmosphere men breathe. Gradually and almost imperceptibly it centralizes power, after which the rest is easy.

War or no war, every move toward any form of dictatorship in our country should instantly be taken by the throat and we must continually remember that the only way forward is back to the principles for which our fathers cheerfully lived and gladly died.

Today the word "reactionary" is in disrepute. But what do we mean by reactionary?

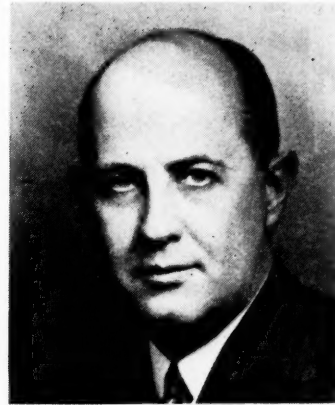
We are thinking of our yesterday, but did not today grow out of yesterday? The fundamentals obeyed by our fathers made this country great. To reverse these will destroy us. I do not mean that they were infallible or knew it all, but they possessed, and demonstrated, the fundamental essentials of success and if we throw these overboard the rest of our cargo will not be worth carrying into port.

The greatest of all fundamentals is the right of the individual.

Russia deprived her people of this right and the Czar and nation paid the

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THE GREATEST ECONOMIC OPPORTUNITY IN THE NATION



BY

Roland C. Irvine

*Vice President, The Chase National Bank
of the City of New York*

WITHIN the past few years the South has shown immense business and industrial expansion. Some of it is due, no doubt, to the usual increase in population, with resulting expansion of local markets, but most of it in my opinion is the result of efforts on the part of Southerners to develop their natural resources and to the vigorous upbuilding of manufacturing industries.

Today there is no question but what the eyes of the industrial and financial East are turned Southward. Even during the depression the South progressed at a rate in the basic line of enterprise which exceeded the growth of other sections.

Between 1931 and 1937 the number of industrial plants in the South and Southwest increased by 1,575. This is in contrast to a decrease of 10,106 plants for the remainder of the country. These are the latest official figures, but from other information available I have every reason to believe that this trend has continued.

Years ago a candidate for Governor was extolling the great virtues of Arkansas and attempted to list the vast resources of the state, and in the confusion of the moment he yelled—"and last but not least, we have the greatest 'linoleum' mines in the world." He was trying to say "aluminum"—(over 90 per cent of the American bauxite—the mineral of aluminum—comes out of Arkansas).

Arkansas is blessed in having within her boundaries fertile soils, vast forests, an abundance of minerals and raw materials. Sometimes referred to as "America's Last Frontier," it stands at the threshold of stirring new developments. The people of Arkansas are now "telling

the world" about their vast resources—power, fine labor conditions, favorable climate, and are urging industrial executives to "look them over."

A few years ago a prominent banker and business man of Pensacola happened to mention to a crowd of New York financiers the splendid natural harbor of Pensacola. One of the New Yorkers asked—"How long have you had it?" Now, nearly everyone knows about Pensacola—its fine harbor and its other advantages. In recent years Florida has been "telling the world."

As a boy I wondered just what would we do with thousands of acres of second growth pine in the Southwest in view of the tremendous and rapid cut of virgin timber.

Recent discoveries of processes for making kraft paper as well as other papers from Southern pine have resulted in the establishment of a number of new large pulp and paper mills within the last few years. One might mention the new International Paper plant in Louisiana, the Rayonier dissolving pulp operation outside of Jacksonville, the Southland Paper Company's newsprint plant in Texas and the substantial investments made by the Union Bag and Paper Company in Georgia. The great pine forests of the South are available for the manufacture of rayon, kraft pulp and board and the efficiency of these new plants results in a cost considerably lower than many other sources of supply. Domestic production of kraft pulp has increased steadily, imports presently being in the neighborhood of 20 per cent, influenced to some extent by the war, as contrasted with 70 per cent a few years ago.

New and powerful forces are changing

the geography of business. Population centers are shifting; new markets are developing; old markets are making new demands; new competition is arising in new places; new legislation is affecting financing, production and distribution. All these and other cumulative forces are bringing about a change of the nation's social and economic balance. As a consequence alert industry is on the move, seeking new locations for its plants and branch factories.

The South presents a new industrial horizon with abundant supply of raw materials—power and labor, equable climate, adequate transportation facilities, more active markets—an increasing population and a cooperative spirit of the people in the various localities.

It is the greatest economic opportunity in the nation today.

J. R. Whiting Succeeds W. L. Willkie in Commonwealth & Southern

At meetings of the Boards of Directors of The Commonwealth & Southern Corporation (New York) and Consumers Power Company, held in New York, Mr. Justin R. Whiting was elected to fill vacancies created by Mr. Wendell L. Willkie's resignation from these Corporations, namely, President and Director of The Commonwealth & Southern Corporation and Chairman of the Board and Director of Consumers Power Company.

The Consumers Power Company is the largest operating unit of The Commonwealth & Southern Corporation (Delaware) and operates entirely within the State of Michigan.



The steam power plant nearing completion

CONSTRUCTING AN ELECTRIC POWER PLANT IN THE SOUTH

BY

J. H. Moore,

Assistant Project Engineer, PWA

and

E. B. Miller

Principal Mechanical Engineer, PWA

BUZZARDS ROOST Project is a power development now nearing completion on the Saluda River in Greenwood and Newberry counties, South Carolina, approximately three miles west of Chappels and 17 miles east of Greenwood, the county seat of Greenwood County. It consists of a hydro-electric plant with an installed capacity of 15,000 K.W. (80% P.F.) in three units and an auxiliary steam plant with one 6,000 K.W. (80% P.F.) unit. The steam turbine and boiler are of sufficient capacity to deliver 7,500 K.W. at Unity P.F.

Being carried out by Greenwood County under its Finance Board, which is the governing body of the County, the work is financed by a PWA loan and grant totaling approximately \$5,200,000 with loan secured by revenue bonds of the County. The work is being executed under F. P. C. license.

At the normal lake elevation of 440 feet above mean sea level, the reservoir created by the dam has an area of approximately 11,500 acres and a capacity of approximately 255,000 acre feet. The lake extends up the Saluda River to within five miles of the Ware Shoals power plant, a distance of approximately twenty-four miles.

The drainage area is approximately 1,100 square miles, and the estimated annual energy 50,000,000 K. W. H., with a drawdown to elevation 420. The river has a low recorded flow at Chappels of 222 c.f.s., and the highest recorded flow is 63,700 c.f.s. In conjunction with the auxiliary steam plant, it will be possible to produce 80,000,000 K.W.H. of firm energy.

Principal items of construction consist of a rolled earth fill diversion dam 2,280 feet long across the Saluda River; a con-

crete spillway and power house in a valley east of the dam, separated from the river by the Buzzards Roost Hill; an intake channel and tailrace for diverting the water through the spillway and power house and back into the natural river bed; a "fuse plug" emergency spillway cut through a ridge west of the dam; and a steam power plant adjacent to the hydro plant, complete with coal handling equipment; with an outdoor substation between the two generating plants. Also included in the project are approximately 106 miles of 44 K.V. transmission line with nine principal substations.

Construction of the diversion dam, power plant and spillway works and fuse plug spillway is being carried out under a single contract.

Diversion of the river and construction of the closure section of the earth dam were effected by constructing a cofferdam to elevation 425 in line with the upstream margin of the dam section. A row of steel sheet piling was driven through the sand and silt overburden to bed-rock and enclosed within the dike composed of uncompacted clay and loose rock. The dam was then completed on foundations prepared similarly to the adjacent section. Spillway openings were successively closed with stop logs, and the concrete weirs completed.

The three hydraulic turbines are each of the vertical shaft automatically adjustable blade (Kaplan) propeller type, direct connected to vertical shaft generators. Propeller blades and wicket gates are hydraulically operated by means of Woodward cabinet type oil pressure governors. The turbines each have a rated capacity of 7,400 H.P. at 60 ft. head at a speed of 240 r.p.m.

The generators each are rated 6,250 Kva, 80% power factor, 3 phase, 60 cycles, 4,150 volts "Y." Each generator is

provided with direct connected 250 volt main and pilot exciters. The generators are self ventilated and provided with water coolers. The maximum operating temperature is 100° Centigrade.

Steam Plant

The building housing the steam plant which is intended for substantially increasing the firm power output of the system and for emergency standby service is approximately 84 ft. x 56 ft. x 41 ft. high, with a pulverizer room wing 30 ft. x 14 ft. x 25 ft. high.

The foundations are of concrete, the superstructure being steel frame with brick walls and steel sash windows. The main building is divided by a row of steel columns and a brick wall between the steam generating equipment and the turbo-generator and auxiliaries.

Pulverized coal will be used for fuel but auxiliary fuel oil storage and burning equipment is provided for continuity of operation in case of temporary inability to obtain coal or breakdown of the coal handling equipment.

Coal will be delivered in railway dump cars on an elevated trestle over a pair of flight conveyors discharging onto a central belt feeder. This feeder conveys the coal to a hopper at the foot of a vertical bucket elevator which delivers the coal through a chute into the top of a 350-ton tile silo. From the silo the coal is delivered by a chute hopper with automatic weighing equipment, and a two-way chute to the two pulverizers.

The steam generating equipment consists of a two-drum vertical boiler with superheater and integral water cooled furnace, dry bottom type, designed for a maximum safe steam working pressure of 425 p.s.i. and for an operating pressure of 750° F. at the superheater outlet.

The generating unit has a maximum continuous capacity of 80,000 lbs. of steam per hour and a two-hour capacity of 85,000 lbs. per hour. The generating plant is complete with auxiliaries, including coal pulverizers and burners, air heater, forced and induced draft fans, automatic combustion control equipment, feed water regulator, duplicate boiler feed pumps, deaerating heater, high pressure heater, evaporator, and make-up pumps and tank.

The turbo-generator is rated at 6,000 K.W. at 80% P.F., 7,500 K.W. at Unity P.F., 3-phase, 60 cycles, 4,150 volts, "Y." It is complete with auxiliaries consisting of direct connected exciter, generator air cooler, surface condenser with circulating and hot-well pumps. The circulating water is obtained from one end of the hydro plant intake and is returned to the opposite end. The circulating pump supplies only the head lost in the circulating pipes and condenser.

The principal transmission system is 3-phase, 44 K.V., forming an 88½ mile loop, with a 17½ mile cross connection and substations at Greenwood, Laurens, Goldville, Ninety Six and Newberry, and at a number of industrial plants, principally cotton mills. An interconnection with the system now under construction by the City of Abbeville is being constructed, and other connections are being considered.

Principal Construction Contracts

Dam, Power House and Spillway—E. W. Grannis and Lee Construction Co.
Clearing Reservoir—E. W. Grannis (E. H. Hines, Supt.)

Transmission Lines and Sub-stations—R. H. Bouligny, Inc.

Steam Plant Building—Lee Construction Co. (J. A. Stewman, Jr., Supt.)

Steam Plant Excavation, Access Railroad, Transmission Line Clearing, Raising Highway Bridges and Approaches—Pennell & Harley, Inc.

Relocation of S.A.L. Railroad—D. M. Rickenbaker.

S.A.L. Bridge Crossings Steel Superstructure—Bethlehem Steel Co.

Principal Equipment Contracts Hydro Plant

3 Hydraulic Turbines and Governors—Baldwin Southwark Corp.

3 Water Wheel Generators, Transformers & Switchgear—General Electric Co.

4 Spillway Tainter Gates and Hoists—Virginia Bridge Co.

6 Penstock Gates & Hoists—Phillips & Davies.

1 40-ton Travelling Crane — Maris Brothers.

1 Trash Rack Rake—S. Morgan Smith Co.

Steam Plant

1 Steam Generating Unit with coal pulverizers, air heater, forced and induced draft fans, combustion control equipment and instruments, feed water regulator and accessories—Babcock & Wilcox Co.

1 Steam Turbo-Generator and switch-gear Equipment—Westinghouse Electric & Manufacturing Co.

1 Surface Condenser with 2 Circulating Pumps and 2 Hot-Well Pumps and accessories—Allis-Chalmers Manufacturing Co.

1 Evaporator—Schutte-Koerting Co.

1 Deaerating Heater—Swarthout Co.

1 Closed Feed Water Heater—Condenser Service & Engineering Co.

2 Boiler Feed Pumps — Ingersoll-Rand Co.

Steam Plant Piping—Poe Heating & Piping Co.

Coal Handling Equipment — W. S. Hogan.

Chimney—Alphons Custodis Chimney Construction Co.

The Finance Board of Greenwood County is composed of:

E. L. Brooks, Chairman, E. I. Davis, Secretary, W. M. Rodgers, M. G. Bowles, R. C. Lominick.

Design and construction of the project is under the jurisdiction of the D. T. Duncan Engineering Co., personnel of which company is:

D. T. Duncan, Chief Engineer, J. G. Wardlaw, Supervising Engineer, G. R. Barksdale, Electrical Engineer, A. T. Brown, Field Engineer, J. L. Foster, Office Engineer, W. L. Daniel, Jr., Office Engineer.

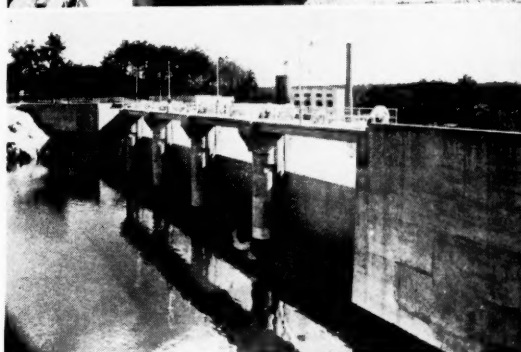
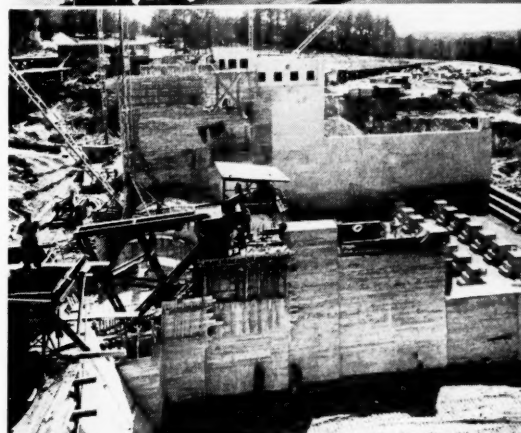
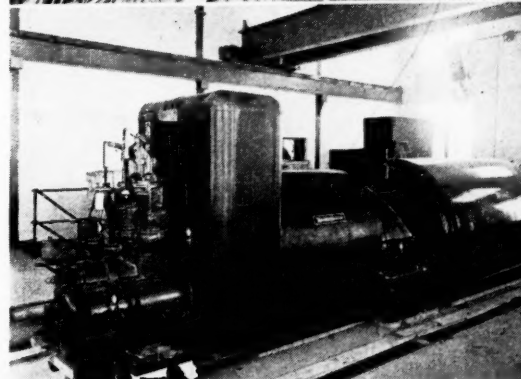
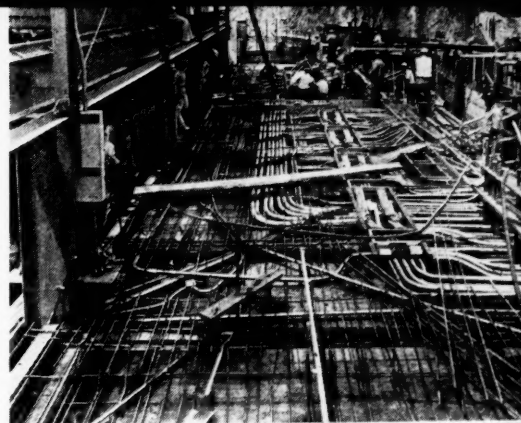
Consulting Engineers:

F. R. Sweeny, Chief Consultant & Designer of Hydro Power House, Joel D. Justin, Consultant on Foundations of Power House and Spillway Structures, George Hill, Steam Plant Consulting Engineer and Designer.

The South Carolina Project Office at Charleston exercises supervision over the project for the Public Works Administration with the following staff:

Kenneth Markwell, Project Engineer, J. H. Moore, Assistant Project Engineer, L. S. Harmer, Senior Hydraulic & Electrical Engineer, E. B. Miller, Senior Mechanical Engineer, S. P. Darlington, Electrical Engineer, W. D. Carpenter, Cost Engineer. W. G. McConnel is Supervising Engineer at the site of the project.

Functions of the Federal Power Commission are exercised by the Atlanta Office, Percy H. Thomas, Director, and Arnold Rich, Resident Engineer Inspector.



Top to bottom — Construction of the main floor of the power house showing conduit arrangement. The steam turbine and generator. The power house and spillway during construction. An upstream view of the spillway after completion with the power house in the background.

UNSHACKLE ARC WELDING AND SPEED PROGRESS

BY

C. M. Taylor

Vice President,
The Lincoln Electric Company,
Cleveland, Ohio.

IT is altogether absurd that a valuable and straightforward industrial process such as arc welding, which has already created tremendous industrial and social benefits, and which will create still greater advances in the future, should be held back by restrictions and regulations which contribute nothing constructive but only serve to impede progress.

The worst feature of all restrictions is that the public many times questions the reliability of welding. There is no mystery in welding. The properly trained and capable welder will consistently make welds stronger than the steel, just as properly trained and able machinists will consistently turn out work machined to the closest tolerances.

Does someone stand over the trained mechanic checking every nut he turns down to make a bolted connection?

Is the trained riveter beset by checkers and inspectors on every rivet he drives?

Is the trained machinist harassed by supervisors on every operation of his lathe?

Are all these trained craftsmen required to pass a test at frequent intervals to qualify for work which they have been doing for years and for which their experience and ability make them fully capable?

Is every single riveted and bolted connection individually examined, inspected and tested?

Obviously, the answer to all of these questions is "No!"

Yet the present trend in regard to arc welding is in that direction. So

many codes, tests, inspections, provisions, restrictions, regulations, etc. are being imposed upon the process that the benefits it inherently creates are being seriously affected. Arc welders are severely handicapped, not only by frequent interruptions to permit inspection of work in process but also by having to be qualified over and over again for a type of work for which they have previously been fully accredited.

There is no more justification for this state of affairs in welding than in any other craft or trade. In fact, there is far less justification. Good welders will consistently make good welds, exceeding the physical properties of the metal welded, and they assure the quality of the weld by *observing the inside of the joint as it is being made* which is not possible with other less-supervised and less-controlled methods of construction.

All these restrictions are due simply to the misplacing of the emphasis and to misunderstanding of the basic principle of arc welding. The uninitiated automatically focus all their attention on the arc welded joint as the crux of the problem just as though the properly welded joint could accomplish any more than make a strong connection, fully as strong as the metal connected. As a mat-

ter of fact a good weld develops the full strength of the steel welded. This being the case, why look to the weld for problems that never exist in reality? Why should every weld be individually inspected and tested when the welder who made it is fully as competent in his work as the riveter or bolter is in his? And why, above all, should an experienced welder be required to pass test after test to qualify for work he has been tested for previously?

All of these hindrances are poor practice and highly unfair to welders. Given proper electrodes and proper equipment, the experienced welder will invariably make good welds. He knows that his production of sound welds will enable his employer to advance through pronounced improvements and economies in operations. He knows also, that the benefits which arc welding creates stimulate expansion of his own industry, and by doing so broaden his opportunities for employment and assure his continued earnings. The good welder is a capable conscientious worker upon whom all of the inspection and qualification tests serve only to work hardship. He wants these restrictions removed in order that he may be free to do his work properly and in order that the way may be cleared for further development and expansion of his industry.

As long as these pointless restrictions, regulations, etc., remain, progress with arc welding will be retarded and the immeasurable benefits that it can and will create for industry and society in general will remain unattained.

NEW PULP AND PAPER MILL STARTS CONSTRUCTION IN SOUTH

CONSTRUCTION of the Florida Pulp and Paper Company's \$2,443,000 pulp and paper mill near Pensacola, Florida, was scheduled to start during the first week of August. The company has contracted for \$1,000,000 worth of machinery and equipment for the plant, which will contain about 3,000,000 cubic

feet of space in the various buildings. Construction materials will be steel, concrete and corrugated asbestos.

Installation of condensers into which the digesters will be relieved, instead of into the air will do away with a very large percentage of the odor and in order to guard against polluting streams with the effluent from the plant, the company has acquired four miles of creek bottom as a part of the plant site and also will build an artificial lake. The effluent will be run into the lake covering

about 20 acres and then into the creek before entering the river, thus eliminating pollution through precipitation and sedimentation. Additional lakes or septic tanks will be installed if and when necessary.

A 600-acre site, 15 miles north of Pensacola between Cantonment and the Escambia River was purchased by the City and leased to the company for \$500 a year for 99 years, with option to purchase. Test wells have been driven which as-

(Continued on page 58)

Defense Program Awards in the South

ALABAMA

Unit	Manufacturer	Item	Amount
Qtmtr. Corps	A. J. Honeycutt Co., Birmingham	Constr. warehouses, MacDill Field, Florida	\$ 153,765.00
" "	Army Construction, Maxwell Field	Magazines, barricades	56,150.00
" "	Gardiner-Warring Co., Florence	Summer undershirts	166,363.70
" "	G. T. Key, Montgomery	Emergency set installation	1,585.00
" "	Aqua Systems, Inc., New York City	Maxwell Field	60,417.00
		Addition to fueling systems, Maxwell Field	

FLORIDA

Qtmtr. Corps		Army Construction, MacDill Field	Magazines, barricades	93,900.00			
"	"	Army Construction, MacDill Field	Bldgs., storage, utilities	848,400.00			
"	"	Army Construction, Elgin Field	Runways, aprons, drainage	250,000.00			
"	"	A. J. Miller Auto Cruiser Trailer Co., Bradenton	2 trailers	2,151.10			
"	"	Kiser Drilling Co., Miami	Water well, Miami Airport	829.69			
"	"	Aqua Systems, Inc., New York City	Fueling system, MacDill Field	97,307.00			
Yards & Docks		W. M. Whitmire, Jacksonville	Boathouse, Naval Air Station, Jacksonville	39,997.00			
"	"	E. & E. J. Pfozter, Philadelphia, Pa.	Dispensary, Naval Air Station	214,110.00			
"	"	M. C. Caddell, Jacksonville	Roads & walks, Naval Air Station, Jacksonville	149,522.00			
"	"	T. A. Loving & Co., Goldsboro, N. C.	Quarters, Naval Station Jacksonville	767,500.00			
"	"	Amer. Laundry Machine Co., Cincinnati, Ohio	Laundry, equipment, Naval Air Station, Jacksonville	49,819.00			
		Duval Engr. & Contracting Co., Jacksonville	Aviation facilities, Naval Air Station, Jacksonville	12,786,000.00			
		The George O. Auchter Co., Jacksonville	Aviation facilities, Naval Air Station, Miami (Opa Locka)	3,500,000.00			
		Batson-Cook Co., West Point, Ga.	Aviation facilities, Naval Air Station, Pensacola	4,000,000.00			
		Fred Howland, Inc., and Jack Quinn, Inc., Miami					
		Hardaway Contracting Co., Columbus, Ga.					
Maritime Comm.	No. 2	C-2 Cargo	Tampa SB & Eng. Co.	Yard	Unit Cost		
"	"	2	C-2 Cargo	Tampa SB & Eng. Co.	Tampa	Launched	1,808,413.00
"	"	2	C-2 Cargo	Tampa SB & Eng. Co.	Tampa	Under const.	1,808,413.00
"	"	2	C-2 Cargo	Tampa SB & Eng. Co.	Tampa	Under const.	1,950,000.00
"	"	2	C-2 Cargo	Tampa SB & Eng. Co.	Tampa	To be built	1,950,000.00

GEORGIA

Medical Dept.	Muscogee Mfg. Co., Columbus	Bath towels	17,946.00
Qtmtr. Corps	Peerless Woolen Mills, Rossville	Wool blankets, O. D.	378,000.00
" "	Peerless Woolen Mills, Rossville	Uniform cloth	1,522,500.00
" "	Army Construction, Atlanta Gen. Depot	Whses, Engr. & Q. M.	700,000.00
" "	Beers Constr. Co., Atlanta	Buildings	218,645.00
" "	Peerless Woolen Mills, Rossville	Wool blankets	184,375.00
" "	W. D. Cole Mfg. Co., Newman	Water tank	11,635.00
" "	J. G. Bartholomew, Dallas, Texas	Sewage treatment plant, Fort Benning	830,750.00
Supplies & Accts.	J. M. Tull Metal & Supply Co., Atlanta	Steel	5,229.21
	Hardaway Contracting Co., Columbus, Ga.	Aviation facilities, Naval Air Station, Pensacola, Fla.	4,000,000.00

KENTUCKY

Medical Dept.	Logan Co., Louisville	Hospital beds	23,780.00
Qtmtr. Corps	Army Construction—Godman Field (Ft. Knox)	Hangar-paving-utilities	740,000.00
" "	Struck Constr. Co.—Louisville	3 motor repair shops—Fort Knox	19,831.00
" "	Sullivan & Cozart—Louisville	Alterations hospital—Fort Knox	7,100.00
Ordnance	Henry Vogt Machine Co.—Louisville	Equipment for chemical system	3,592.50

LOUISIANA

Qtmtr. Corps	Army Constr.—Barksdale Field	Magazines barricades	116,950.00
" "	Army Constr.—Barksdale Field	Bldgs.—utilities—firing range	204,400.00
" "	Aqua Systems, Inc., New York City	Gasoline storage & dispensing system—Barksdale Field	129,380.00
" "	Empire Electric Co., Ft. Worth, Texas	Night lighting—Barksdale Field, La.	1,890.00

MARYLAND

Chemical Warfare Ordnance	Federal Tin Co., Inc., Baltimore	Guards, machine aids, etc.	660.00
Qtmtr. Corps	Revere Copper & Brass Co., Baltimore	Ammunition parts	4,520.00
" "	Casey Jones, Inc., Baltimore	Working suits (Gov't material)	15,370.00
" "	Maryland Paint Co., Baltimore	Painting tanks—Ft. George G. Meade	1,960.00
" "	Arch Metal Constr. Co., Baltimore	Metal shelving in barracks—Aberdeen	1,513.00

(Continued on page 54)



Southern Construction Nears Record Peak during July

A NEW Southern construction record for July was established last month when contracts awarded in the sixteen States below the Mason and Dixon line reached \$131,869,000. Only one other month in the South's construction history—June of 1930—has topped this figure.

Precipitous rises in Governmental construction, including several immense contracts awarded on a cost plus basis, and an industrial contract total of proportions greater than that for any other month in the last eight, were mainly responsible for the July peak.

Private building during July, with exception of industrial construction, was at a lower level, although one type of work—commercial building—showed a gain over June.

Highway contracts dropped, in comparison with the new work in this field placed under contract during June. Road building and bridge erection on a national system of highways already inadequate for an expanding mechanized military force, seemed to have been forgotten in the rush to get operations started at va-

rious Army posts and Naval bases.

July's government construction, much of which was for national defense, amounted to \$50,958,000, a continuation of the rapidly increasing rate of military construction first recorded in June. Big contracts contributing to this rise included: a \$1,422,000 award for additions to the Navy's headquarters in Washington, D. C.; a \$8,500,000 contract covering ship-building facilities at the Norfolk and Philadelphia Navy yards; a \$12,786,000 contract for completing the Naval Air station at Jacksonville, Fla.; a \$3,500,000 award for constructing the auxiliary Naval Air Base near Miami, Fla.; a \$4,000,000 contract for constructing additional aviation facilities at the Pensacola, Fla., Naval Air station; a \$12,700,000 award for a new Naval Air station at Norfolk, Va., and a \$1,460,250 contract for enlarging aviation facilities at the Quantico, Va., Marine base.

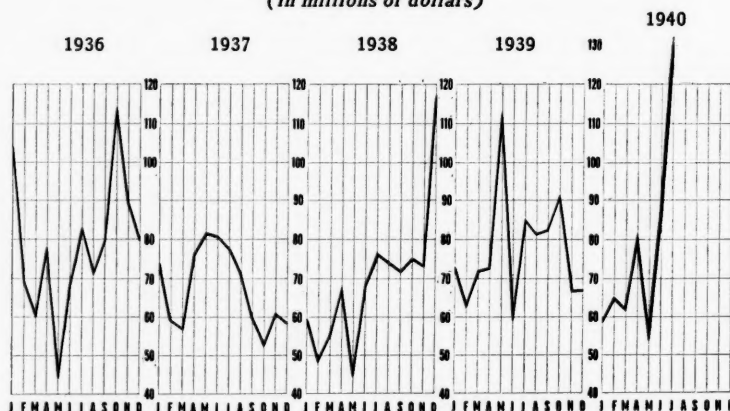
Industrial contracts amounted to \$21,903,000. Railroads placed orders for new rolling stock and materials to improve roadbeds; manufacturers either started

*big defense
awards add
to second
highest total
for all time*

work or prepared to go forward with important industrial developments; gasoline companies proposed pipeline and refining projects; power companies continued to add to programs involving many millions of dollars.

The largest manufacturing plant placed under contract was the \$3,000,000 plant of the Florida Pulp and Paper Co. This project is being carried out on a 600-acre site north of Pensacola. Clearing and railroad spur construction is under way. Rust Engineering Co., Pittsburgh, Pa., received the construction award. Con-

Southern Construction Trends by Months
(in millions of dollars)



Work started during July on a \$450,000 factory and office at Dallas, Texas, for Haggard Co., pants manufacturers. The new plant, (above) located in a newly developed industrial district where Campbell-Taggart Associated Bakeries and Coca-Cola Co. have recently built big factories, will be of tapestry brick with cream stone trim. To be 528 feet long and 300 feet wide, the building will contain 90,000 square feet of usable floor space. Cowdin Brothers are the general contractors. The architects are J. A. Pitzinger and Roy E. Lane, associates.

Statistics of South's Construction

	July, 1940 Contracts Awarded	July, 1940 Contracts to be Awarded	Contracts Awarded First Seven Months 1940	Contracts Awarded First Seven Months 1939
PRIVATE CONSTRUCTION				
BUILDING				
Assembly (Churches, Theatres, Auditoriums, Fraternal)	\$2,062,000	\$2,487,000	\$11,095,000	\$10,105,000
Commercial (Stores, Restaurants, Filling Stations, Garages, etc.)	3,371,000	1,668,000	18,514,000	18,183,000
Residential (Apartments, Hotels, Dwellings)	8,210,000	4,216,000	60,683,000	60,562,000
Office	837,000	788,000	12,834,000	12,572,000
	\$14,480,000	\$9,159,000	\$103,126,000	\$101,422,000
INDUSTRIAL	\$21,903,000	\$39,524,000	\$69,792,000	\$57,205,000
PUBLIC CONSTRUCTION				
BUILDING				
City, County, State, Federal	\$50,958,000	\$72,533,000	\$122,009,000	\$82,130,000
Housing	9,982,000	22,262,000	36,841,000	38,661,000
Schools	2,007,000	6,408,000	46,801,000	48,732,000
	\$62,947,000	\$101,204,000	\$205,651,000	\$169,523,000
ENGINEERING				
Dams, Drainage, Earthwork, Airports ..	\$11,814,000	\$16,031,000	\$42,661,000	\$37,676,000
Federal, County, Municipal Electric ...	3,746,000	62,092,000	35,983,000	39,974,000
Sewers and Waterworks	1,166,000	7,470,000	17,626,000	20,250,000
	\$16,726,000	\$85,593,000	\$96,270,000	\$97,900,000
ROADS, STREETS AND BRIDGES	\$15,813,000	\$34,794,000	\$109,510,000	\$111,532,000
TOTAL	\$131,869,000	\$270,274,000	\$584,349,000	\$537,582,000

tracts for \$1,000,000 worth of equipment was also announced as placed.

Bibb Manufacturing Co., with mills at Macon, Columbus and Porterdale, Ga., proposed a \$2,250,000 expansion and modernization program. Beyond the fact that a portion of the equipment has been ordered, the company has given few details. Memphis Natural Gas Co., Memphis, Tenn., proposed a \$1,250,000 natural gas line extension to raise its capacity between Memphis and Monroe, La., to 80,000,000 cubic feet daily.

Nantahala Power & Light Co., North Carolina subsidiary of the Aluminum Company of America, signed a contract with Morrison-Knudson Co., Boise, Idaho, for its Glenville hydroelectric project and with the Utah Construction Co., San Francisco, Calif., for its Nantahala project. Work will continue for two years on the first and for over a year on the latter.

Kentucky Utilities Co., of Lexington, Ky., announced its proposal to erect a \$4,000,000 power plant. Consolidated Gas, Electric Light & Power Co., Baltimore, filed a statement with the Securities Exchange Commission on a new preferred stock issue, the proceeds from which is for capital expenditure reimbursements, etc. This company is understood to be planning a large plant in addition to several units now under way at its Westport station.

H. L. Hunt, of Shreveport, La., is reported to be planning a \$2,000,000 recycling plant in Webster Parish, estimated cost being \$2,000,000. Glenn L. Martin, Baltimore aircraft manufacturer, is adding to his buildings and is also reported to be planning a decentralization program involving establishment of one or more factories. Solvay Process Co., of Syracuse, N. Y., is to construct a fully equipped power plant at its Baton Rouge, La., chemical plant.

Expenditure of \$3,400,000 is reported proposed by Southern Union Utilities Co. for a pipe line from Franklin to the Abbeville gas field in Louisiana. Work

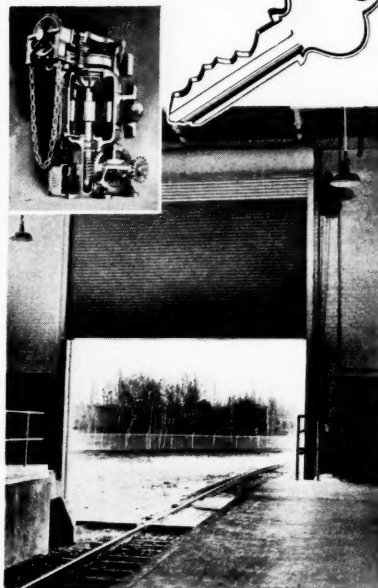
is expected to start soon on a \$400,000 car paint shop at the St. Louis, Mo., plant of the American Car & Foundry Co. The one-story brick building will be 1,000 feet long. Norfolk & Western Railway Co., Roanoke, Va., has already started constructing a 224-car capacity yard for the same purpose.

Norfolk & Western also awarded contracts for new hopper cars and 131-pound steel rail. Virginia Bridge Co., and Bethlehem Steel Co. each received 500 of the cars, which altogether will cost \$1,130,000. The latter company and Carnegie-Illinois Steel Co. will furnish the rail. Illinois Central, operating in a number of Southern states, placed an order with Pullman-Standard Car Manufacturing Co., Bessemer, Ala., for 1,000 all-steel box cars to cost \$2,500,000. New streamlined cars are being purchased by Illinois Central from Pullman-Standard, the diesel locomotive for which will be supplied by Electro-Motive Corp.

Baltimore & Ohio Railroad, Baltimore, also placed an order with Electro-Motive Corp. for 25 diesel electric switching engines. B. & O. pier 8 is to be altered at Baltimore under a contract with Frainie Brothers, local contractors. Southern Pacific's new equipment will include 20 4-8-4 passenger locomotives. A \$300,000 passenger station project at Shreveport, La., was let to Nathan Wohlfeld, Dallas, Texas, by Texas & Pacific.

Seaboard Air Line is to add to its diesel locomotive repair shop at Miami, Fla. Orders placed by the Mobile & Ohio with Pullman-Standard and American Car & Foundry Co. were for 1,250 hopper and box cars. Steel box cars and cabooses totaling 1,100 were ordered by Chesapeake & Ohio Railway from American Car & Foundry Co., General American Transportation Corp., Mount Vernon Car Manufacturing Co., Pullman-Standard, Greenville Steel Car Co., St. Louis Car Co. and Magor Car Corp. A warehouse addition is being built at Richmond, Va., by the Richmond, Fredericksburg & Potomac.

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KINNEAR MOTOR OPERATED ROLLING DOORS

In busy plants doors that open rapidly smoothly and easily mean savings in time, labor and money! But Kinnear Motor Operated Rolling Doors bring you even more—the extra efficiency of remote control! Think of the convenience of being able to operate doors quickly from any number of convenient points—at the touch of a button! Kinnear Rolling Doors save valuable floor and wall space, too, because they coil compactly out of the way above the opening. They open out of reach of damage by wind or trucks. And their rugged, all-steel construction and sound engineering make long lasting service a certainty. They will not sag, warp, or split; they are burglar proof, vermin proof, weathertight, and fire repellent.

All these advantages—and many others—explain the proved operating and maintenance economy of Kinnear Rolling Doors. The Kinnear Catalog will show you how you can cut door costs in your plant. Write today for your copy.

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**KINNEAR
ROLLING DOORS**

New Industrial Plants and Expansions in the South During July, 1940

Contracts Awarded

Ala., Anniston—Nehi Bottling Company; plant		Florida—Frank Carnelious & Son; furniture plant	
Ala., Birmingham—Tennessee Coal, Iron & Railroad Co.; plant equipment		Fla., Belle Glade—City Fuel & Ice Co.; packing plant	100,000
Ala., Mobile—Alabama Power Company; power plant building		Fla., Crestview—Clay Strickland; shuttlecocks plant	
Ala., Mobile—Mobile & Ohio R. R. (Receivers); equipment		Fla., Daytona Beach—Gresham Motors Co.; building	
Ala., Mobile—Southern Kraft Co.; mains		Fla., Deland—Babcock Aircraft Corp.; factory unit	
Ala., Muscle Shoals—Electro Metallurgical Co.; packing and storage building		Fla., Miami—Seaboard Airline Railway; diesel shop	
Ala., Selma—Selma Bakery; plant	\$30,000		
D. C., Washington—Potomac Electric Power Co.; generating equipment		Ga., Atlanta—A B C Truck Lines, Inc.; terminal	
Fla., Miami—Benner Box & Printing Co.; factory		Ga., Baxley—R. M. Dunn; bus station	
Fla., Miami Beach—Peoples Water & Gas Co.; gas and oil tanks	50,000	Ga., Columbus—Greyhound Bus Lines; terminal	50,000
Fla., Pensacola—Florida Pulp & Paper Co.; plant	3,000,000	Ky., Lexington—Kentucky Utilities Co.; power plant	4,000,000
Fla., Tampa—Polk Company; warehouse	15,000	Ky., Mt. Sterling—Texaco Oil & Gas Co.; bulk plant	
Ga., Atlanta—Chevrolet Motor Co.; plant additions and alterations		Ky., Paducah—Curtis Lighting, Inc.; plant	
Ga., Cartersville—Cartersville Coca-Cola Bottling Co.; plant		Ky., Paris—R. J. Reynolds Tobacco Co.; prize plant	
Ga., Gainesville—Owen-Osborne Company; mill addition		Ky., Versailles—Brown-Forman Distillery Co.; distillery	
Ky., Louisville—Louisville Coca-Cola Bottling Co.; plant	200,000		
Ky., Maysville—January & Wood Co.; warehouse		Louisiana—H. L. Hunt; recycling plant	2,000,000
La., Baton Rouge—Louisiana & Arkansas-Kansas City Southern Lines; equipment		La., Alexandria—Cotton Brothers Baking Co.; alterations and additions	40,000
La., Donaldsonville—Southern Utilities Co.; gas line		La., Baton Rouge—Solvay Process Co.; power plant	
La., Shreveport—Texas & Pacific Railroad; station	300,000	La., Baton Rouge—Standard Oil Development Co.; buna rubber plant	
Md., Baltimore—Baltimore & Ohio R. R. Co.; equipment		La., New Orleans—Southern Bell Telephone & Telegraph Co.; warehouse	
Md., Baltimore—Eastern Overall Cleaning Co.; building			
Md., Baltimore—Joseph E. Lewis & Co., Inc.; building		Md., Baltimore—General Motors Corp.; factory alterations	
Md., Baltimore—Charles J. Spielman & Co., Inc.; building		Md., Baltimore—A. Howard Johnson; ice cream plant	
Md., Dundalk—Frankfort Distilleries, Inc.; warehouse		Md., Baltimore—Glenn L. Martin Company; airport improvements	
Md., Relay—Calvert Distilling Co.; alterations		Md., Baltimore—Meadow Gold Ice Cream Co.; addition	
Miss., Raymond—Gadd's Motor Company; garage	12,250	Md., Baltimore—Standard Oil Company; printing plant alterations	20,000
Missouri—American Telephone & Telegraph Co.; repeater stations		Md., Bradshaw—A. C. Radziszewski (Arch.); factory	
Mo., Hume—Sinclair Coal Co.; office and shop building	25,000	Md., Oakland—Carnation Company; milk receiving station	50,000
Mo., North Kansas City—Cook Paint & Varnish Co.; paint plant		Md., Vienna—Delmarva Power Co.; power plant extension	
Mo., St. Louis—Krey Packing Co.; plant remodeling			
Mo., St. Louis—Laclede Packing Co.; plant addition		Mo., Kansas City—Electric Storage Battery Co.; plant	250,000
Mo., St. Louis—National Slug Rejection, Inc.; factory and office building		Mo., St. Louis—American Car & Foundry Co.; paint shop	400,000
North Carolina—Nantahala Power & Light Co.; hydro-electric projects		Mo., St. Louis—Pittsburgh Plate Glass Co.; plant	350,000
N. C., Greensboro—Greensboro Overall Co.; plant addition	20,000	Mo., St. Louis—Puro Company; plant	
N. C., Roanoke Rapids—Fatterson Mills Co.; roofing		Mo., St. Louis—St. Louis Flying Service, Inc.; improvements	75,000
S. C., Charleston—Charleston Coca-Cola Bottling Co.; plant		Mo., St. Louis—Shell Oil Co., Inc.; expansion	3,250,000
S. C., Orangeburg—Jeffords Machine Shop; building	15,000		
S. C., Rock Hill—Ardye Company; chemical plant		North Carolina—Southern Bell Telephone & Telegraph Co.; dial system	65,000
Tenn., Clinton—Southern Bell Telephone & Telegraph Co.; building		N. C., Burlington—May Hosiery Mill; box plant	
Tenn., Nashville—Nashville Coach Company; buses		N. C., Charlotte—Miller Motor Express; expansion program	
Texas—Pan-American Refining Corp.; pipe line		N. C., Charlotte—Refining, Inc.; chemical plant	15,000
Texas—Panhandle Eastern Pipe Line Co.; pipe		N. C., Hickory—Knit Sox Hosiery Mills; plant	
Tex., Alice—The Borden Company; creamery building		N. C., New Bern—Barbour Boat Works; plant enlargement	
Tex., Austin—Alcasieu Lumber Co.; planing mill	19,000	N. C., Raleigh—Atlantic Greyhound Corp.; bus terminal	80,000
Tex., Austin—Covert Automobile Co.; building	32,444	N. C., Raleigh—Southern Dairies, Inc.; dairy	
Tex., Beaumont—Beaumont City Lines; terminal	47,000	N. C., West Jefferson—Blue Ridge Cold Storage Cooperative; plant	25,000
Tex., Brownsville—W. R. Davis & Co.; storage tanks			
Tex., Bryan—Southwest Telephone Co.; addition		S. C., Aiken—Aiken Electric Refrigeration Cooperative; plant	
Tex., Freeport—Dow Chemical Company; plant roofing			
Tex., Houston—Bowen Trailways; equipment	277,500	Tenn.-Va., Bristol—Bristol Aircraft Corp.; plant	
Tex., Sherman—Mid-Texas Lumber Co.; lumber yard		Tenn., Chattanooga—Bellanca Marine & Aircraft Manufacturing Co.; plant	1,000,000
Va., Appomattox—Stonewall Mining Co., Inc.; plant		Tenn., Memphis—Memphis Natural Gas Co.; gas line expansion	1,250,000
Va., Bluefield—Imperial Ice Cream Co.; plant	65,000	Tenn., Memphis—Nurre Companies, Inc.; glass plant	50,000
Va., Charlottesville—Charlottesville Woolen Mills; dye house			
Va., Richmond—East Coast Freight Lines; depot	62,500	Tex., Beeville—Continental Oil Co.; bulk plant	
Va., Roanoke—Norfolk & Western Railway; coal cars	1,130,000	Tex., Corpus Christi—Central Power & Light Co.; addition	5,000,000
Va., Warrenton—Fauquart Democrat; building	25,000	Tex., Dallas—Hall Aluminum Aircraft Corp.; plant	
W. Va., Charleston—Charleston Tractor & Equipment Co.; building	70,000	Tex., Fort Worth—Central Freight Lines, Inc.; freight terminal	31,435
W. Va., Charleston—R. F. Irwin; garage and store room	25,000	Tex., Galveston—Firestone Tire & Rubber Co.; building	30,000
W. Va., Huntington—Marianna Smokeless Coal Co.; two tipples		Tex., Gladewater—Chamber of Commerce; locker plant	
		Tex., Houston—Chicago Bridge & Iron Co.; plant	
South—Chesapeake & Ohio Rwy. Co.; equipment	2,500,000	Tex., Houston—Chicago Pneumatic Tool Co.; building	15,000
South—Illinois Central R. R.; equipment	170,000	Tex., Houston—Dunigan Tool & Supply Co.; plant	15,000
South—Norfolk Southern R. R.; equipment	9,993,750	Tex., Houston—Eastern States Petroleum Co., Inc.; dock construction	125,000
South—Pennsylvania R. R.; equipment		Tex., Houston—Leon Finch, Ltd.; office and factory building	
		Tex., Houston—Hudson Engineering Co.; building	20,000
		Tex., Houston—Ideal Cement Company; plant expansion	
		Tex., Houston—Knapp Motor Company; service building	
		Tex., Houston—McDonough Iron Works; plant	
		Tex., Houston—Southern Bread Company; plant addition	
		Tex., Lubbock—Southwestern Bell Telephone Co.; addition	
		Tex., McAllen—Jack Williams; packing plant	90,000
		Tex., San Antonio—Josh Brandt; poultry plant	130,857
		Tex., San Antonio—Richter's Bakery; building	
		Tex., San Antonio—San Antonio Portland Cement Co.; silo bins	40,000
		Tex., Seymour—Baylor Electric Co.; generating plant	
		Virginia—Chesapeake & Potomac Telephone Co.; additional equipment	1,778,000
		Va., Lynchburg—Virginia Kittle Candy Co.; candy factory	
		Va., Newport News—Suttle Motor Co.; showroom	
		Va., Norfolk—Hogshire Tent & Awning Co., Inc.; factory	
		Va., Radford—Burlington Mills Co.; plant increase	
		Va., Richmond—Reynolds Metal Co., Inc.; addition	200,000
		Va., Winchester—Southern Bell Telephone Co.; building	
		W. Va., Marlinton—Greenbrier Ore Co.; mining facilities construction	
		South—Bibb Manufacturing Co.; expansion and modernization program	2,250,000
		South—Southern Pacific Company; equipment	

Contracts Proposed

Ala., Birmingham—Try Me Bottling Co.; plant addition ..	\$25,000
D. C., Washington—Chesapeake & Potomac Telephone Co.; plant and equipment ..	1,743,000
D. C., Washington—Continental Baking Co.; garage	

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IN

Latest News on the Washington National Airport—

24 International TD-18's are Speeding it to Completion!



Above: The International TD-18 Diesels turn, mix, and dry the fill material. They also distribute and re-distribute it around the airport and into the runway bases. An unusual rock formation from the river bed makes it tough on tracks, but the TD-18's are standing the punishment in good shape.

AMERICA'S largest airport and terminal, at Gravelly Point, Va., serving the nation's capital, is now being rushed to completion with the aid of 24 International TD-18 Diesel TracTractors. These powerful crawlers have taken over this tremendous earth-moving job as a result of the outstanding performance of one of these units which went on the job a year ago.

When the new TD-18 hit the market early last year, the demand far exceeded the supply. As soon as the Northern Virginia Construction Co., Alexandria, managed to get one, they put it to work on the Washington Airport. Right from the start, the TD-18 became the most popular tractor on the field. Everyone wanted to use it. Unqualified statements made by those who got it, labeled the TD-18 as the *best tractor on the field regardless of size*.

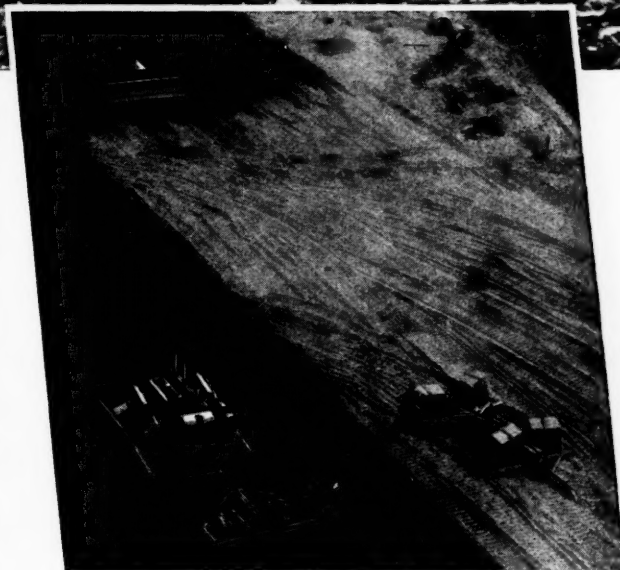
With all these men *the reputation of this great tractor was made*. It was natural, then, for 12 more TD-18's to get the call in February. Today there's a total of 24, owned by the Northern Virginia Construction Co.; L. B. Smith, Harrisburg; and the Capital Excavating Co., Highway Engineering Co., and Morauer and Harzell, Washington. In addition, there are 2 International I-40 wheel-type tractors on the job.

The International TD-18 Diesel *had to be plenty good on the Washington Airport—as on every job*, because it's been under the severest scrutiny. And its three new smaller brothers are carrying on the good work. See the International industrial power dealer or Company branch near you about the four International Diesel TracTractors.

INTERNATIONAL HARVESTER COMPANY
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Efficient, 24-hour-a-day service is provided on this job by the Paving Supply & Equipment Co., International industrial power dealers at Washington and Baltimore.

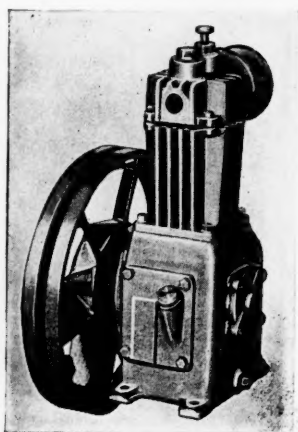


INTERNATIONAL Industrial Power

New Ways of Doing Things

Small Air Compressors

Supplementing its line of portable and stationary air compressors, the Sullivan Machinery Company, Michigan City, Ind., is offering a group of compressor units in smaller sizes. This new line, known as Type "Q," is applicable for industrial, garage and Diesel starting service. Units are air cooled—single and two stage—and range in capacity from 2.8 to 45.7 C.F.M., $\frac{1}{2}$ to 10 H.P., with operating pressures (continuous) 100-200 lbs. and (intermittent) 150 to 500 lbs. The smallest unit is



Type "Q" Sullivan Air Compressor

10 $\frac{1}{2}$ by 14 by 18 inches high, while the largest is 20 $\frac{3}{4}$ by 19 $\frac{1}{2}$ by 25 $\frac{3}{4}$ inches high. Type "Q" compressors have cushioned air valves, balanced crankshaft, taper roller main bearings, Lynite connecting rods, semi-steel pistons, positive lubrication, copper intercooler, chrome nickel cylinders and dust-proof crankcase. Units are available bare, base mounted or tank mounted, for V-belt drive from motor or air cooled gasoline engine. Units for Diesel starting may have combination motor and gasoline drive, so arranged that the belt may be shifted readily to the gasoline engine in case of current failure.

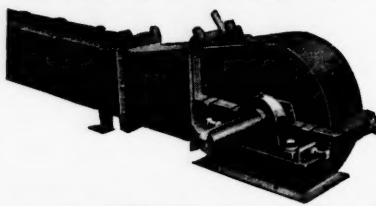
Gear-Shift Motor Eliminates Belt Shifting

For providing instant interchangeability in speed without shifting a belt, a new automotive gear shift has been introduced by the Lima Electric Motor Company, a subsidiary of the Lima Armature Works, Inc., Lima, Ohio. The gear-shift is built to give three speeds forward and one reverse, or four speeds forward and in reverse with the aid of a reversing switch. It is built as an integral part of the motor and also as a gear-shift drive which can be used with any standard motor. A lathe bracket for use with the latter is also made. The new gear-shift, it is said, because of its instant speed changeability, is particularly adapted for use on lathes, milling machines, jointers, planers, drill presses, grinders and other machines with which there is need for

speed changes. In addition to the automotive gear-shift, the Lima Electric Motor company builds a complete line of industrial motors.

Streamlined Conveyor-Elevators

Announcing the streamlining of its entire line of REDLER Conveyor-Elevators, Stephens-Adamson Manufacturing Company, Aurora, Ill., declares that, due to this improved casing design, the REDLER becomes a most attractive as well as efficient piece of plant equipment. Compact and comparatively inconspicuous, the

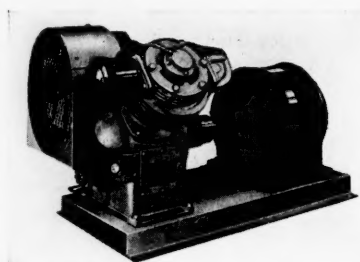


Streamlined REDLER Conveyor Elevator

Redler requires less space than other types of conveyor-elevator for carrying a given quantity of material, it is claimed, handling pulverized, granular, small lump, and flaky materials in any required direction—even around corners. Streamlining is particularly noticeable at the head and tail ends of the conveyors and elevators, the new design having been applied to all styles of REDLERS, including the Loop Boot Elevator and L-Type Conveyor-Elevator.

Small Stationary Compressor

The Sullivan Machinery Company, Michigan, City, Ind., offers a new small stationary compressor suitable for small industries and standby service. Compact, of light weight and smooth running, it requires little floor space and minimum power. It is Model WL-70 Unitair a two



Model WL-70 Unitair Compressor

cylinder, single stage unit with complete air cooling, built-in after-cooler, force feed lubrication, heavy duty ball main bearings; low lift, long life valves, air filter silencers on each cylinder, automatic regulation, and easy accessibility for inspection. The machine is made in four sizes and is motor driven on a rigid sub-base, direct connected or V-belt driven; also less sub-base with V-belt sheave or flat belt pulley.

Non-Magnetic Alloy Steel

Developed especially for the electrical industry, a non-magnetic, free machining alloy steel possessing low magnetic permeability with superior mechanical properties is announced by the Jessop Steel Company, Washington, Pa. Jessop Non-Magnetic Steel has a magnetic permeability of only 1.003 to 1.006 at 1000 Oersted magnetizing force at temperatures from sub-zero to boiling. It has high electrical resistance which considerably reduces current eddy loss. In the annealed condition, it has tensile strength of 80,000 to 110,000 pounds per square inch, and can be readily formed, welded or machined.

New Ingredient Improves FLEXTITE

Marking the first important discovery in its new laboratory, Flexrock Company, Philadelphia, Pa., through its chief chem-



Showing Actual Repair Being Made Against Water Pressure Using Improved FLEXTITE

ist, has developed a new active ingredient which, used in FLEXTITE, brings its activity down to a measure of seconds instead of minutes as in the case of many other leak-stopping materials. This new FLEXTITE is used with ordinary Portland cement and forced against water pressure, held there only a few seconds and the leak is stopped. FLEXTITE is particularly valuable

Improved Small Diesel Engines

Claimed to develop more power per cubic displacement, a new line of Diesel engines, equipped with the Lanova combustion chamber, has been announced by the Stover Manufacturing and Engine Company of Freeport, Ill. These new Stover Diesels are declared to be smoother running and more economical to operate. They are available in four sizes and with a variety of mountings, the 7 $\frac{1}{2}$ horsepower and 10 horsepower models being of the single-cylinder type and the 15 horsepower and 20 horsepower models of the twin-cylinder type. The twin-cylinder models have No. 1 Bell housing with enclosed flywheel.

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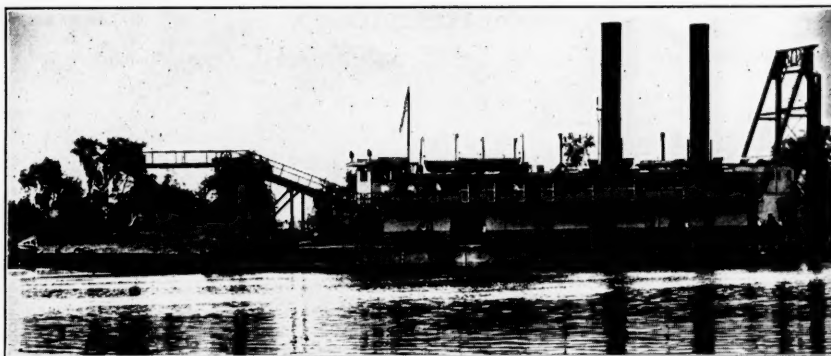
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NEW WAYS OF DOING THINGS

Air-Cooled Electric Hoist

Under the name of "Load King," a new low-cost, air-cooled, wire-rope, electric hoist has been introduced by the Philadelphia Division of The Yale & Towne Manufacturing Company. Originated by Yale & Towne, air-cooled electric hoists eliminate excess brake heat and permit heavier duty cycles. The new unit is made in two capacities— $\frac{1}{4}$ and $\frac{1}{2}$ tons—and is available in three types: lug, hook or plain trolley, with a coice of right angle or parallel suspension. Important features include maximum ruggedness and strength, simplicity of design, operation and maintenance; standardized interchangeability of repair parts, small overall dimensions, maximum use of ball or roller bearings, and high efficiency. The unit may be operated out-of-doors as well as under all normal plant conditions.

Snip For Metal, Cable and Tubing

An improved compound action aviation snip for making difficult cuts on all grades of steel up to 16 gauge, BX cable,



New Penco No. 95a Super Aviation Snip

BX heavy flexible tubing and wire up to 16 gauge, has been announced by the Penn Tool Company of Philadelphia, Pa. Known as the New Penco No. 95a, the tool has a greatly improved compound action which requires less leverage for heavy duty work and eliminates the necessity of carrying various cutting tools on the job. It has a special locking device that will not interfere with cutting operations. To make the most difficult cuts, it is not necessary to open the snips more than one-half inch, thus saving the hands and arms from tiresome widespread operation. The snip makes a $\frac{1}{4}$ -inch short cut and up to $1\frac{1}{4}$ -inch long cut. Blades are beveled and made from chrome vanadium alloy molybdenum steel, with serrated cutting edge that will not slip or turn, and test to 60 Rockwell hardness. Handles are cold rolled steel, gun metal finish, and knurled to give a firmer hold.

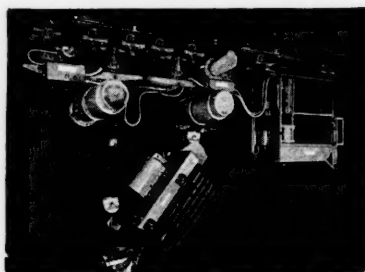
Seybold Precision Knife Grinder

Made in three standard sizes—70-inch, 100-inch and 128-inch lengths—a newly designed Seybold Precision Knife Grinder has been announced by the Seybold Division, Harris-Seybold-Potter Company, Dayton, Ohio. This is a high speed machine with automatic grinding wheel feed and centrifugal pump cooling system. It is equally well adapted to grind shear blades or beveled knives, it is claimed, such as planer, chipper, hog, barker, veneer, paper, rag, granulating, tobacco, and scraper or doctor blades. A unique feature is a hollow three-sided knife bar, each surface presenting a different series of angles to the action of the traveling grinding wheel. A fourth open side makes

it easy to bolt or clamp various types of blades to the bar.

Tilting Box Grab and Tram-rail Carrier

A tilting box grab and Tramrail carrier that picks up boxes, sets them down, or empties them by tilting, has been developed by the Cleveland Tramrail Division of The Cleveland Crane & Engineering Company, Wickliffe, Ohio. All operations are manipulated by means of controllers in the cab. Equipment consists of a cab-operated Cleveland Tramrail



Tilting Box Grab and Tramrail Carrier Manipulated by Controllers in Cab

motor-driven carrier with two independent hoisting units and motorized grab. The hoisting units make it possible to raise or lower boxes as desired and empty them as fast or as slowly as may be required. Boxes may be picked up or spotted in place easily and quickly by the cab operator even at distances 30 or 40 feet below the carrier, it is claimed, making floor men unnecessary. Suspension brackets make it possible to interlock the boxes, thus facilitating stacking. Units of any size up to 5 tons capacity may be furnished. The carrier travels on arch beam rails at 300 feet per minute, and tote boxes, spool boxes and other type containers may be handled.

Asbestos Frictional Material

New performance characteristics are claimed to have been achieved in a new type of asbestos friction material for



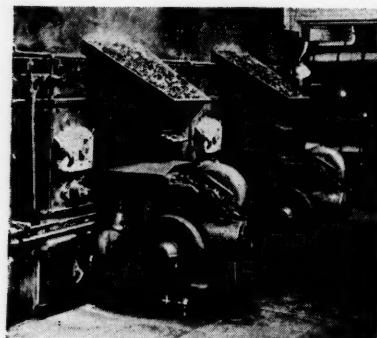
New Asbestos Frictional Material for Brakes and Clutches

brake lining and clutch facings, developed by the GATKE Corporation, Chicago, Ill. This new product is an unique com-

bination of moulded and woven structures in proper balance to retain the best qualities of each, it is declared. Severe laboratory tests and hard service on a wide range of tough applications are said to have shown that this woven-moulded combination maintains a high frictional coefficient with extraordinary uniformity under widely varying conditions of load and temperature. On a number of particularly severe applications the new material has given many months of trouble-free service. It can be furnished to accurate dimensions in all shapes and sizes for brake and clutch requirements.

Detroit Stoker Equipment in Washington and Lee University Heating Plant

In keeping with the modern design and construction of its new central heating plant, Washington and Lee University of Lexington, Va., installed two Detroit single retort, heavy duty, UniStokers with 150-horsepower Union Three-Drum, Low Head Bent Tube boilers having furnace widths of 6 feet. The installation is designed to operate at 100 pounds pressure, the stokers being of sufficient capacity to develop up to 175 per cent normal rating when burning $1\frac{1}{4}$ -inch nut, pea,



Detroit Stokers in University's Central Heating Plant

and slack, or crushed run-of-mine bituminous coal.

Each stoker is an independent self-contained, steam turbine driven unit, with turbine and full-housed blower conveniently mounted at the stoker front. A complete system of Bailey regulation was installed, which provides a control of fuel and air supply, in accordance with changes in load and assuring maximum operating efficiency under all conditions.

The equipment was manufactured by the Detroit Stoker Company, Detroit, Mich., of which The Hawkins-Hamilton Company, Richmond, Va., is a representative. Wiley & Wilson of Lynchburg, Va., handled engineering.

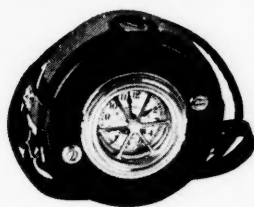
Lyon Sorting Rack

Featuring a recessed bottom which permits racks to be securely stacked, a new steel sorting rack has been introduced by Lyon Metal Products, Incorporated, Aurora, Ill. Another noteworthy feature of the new rack is the hand-removable shelves, which are adjustable every half inch. The rack is equipped with nine shelves $11\frac{1}{2}$ inches wide, and a full base to form 12 compartments. Each removable shelf has a label-holder $\frac{1}{2}$ inch high by $2\frac{1}{2}$ inches long, while the base is fitted with a label-holder $\frac{1}{2}$ -inch high which runs nearly the full width of the rack.

(Continued on page 63)

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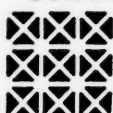
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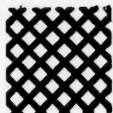
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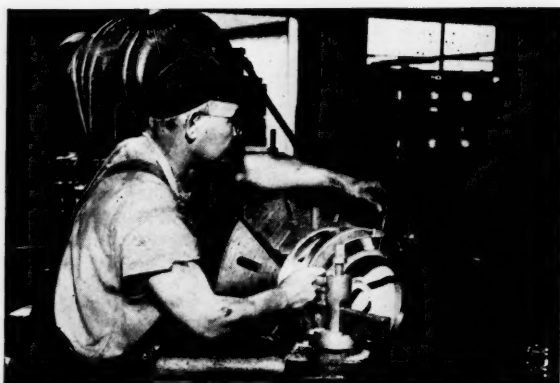
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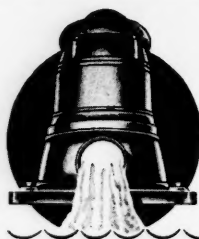
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LAYNE-BOWLER NEW ENGLAND COMPANY, BOSTON
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FINANCE

» » » and « « « INDUSTRY

Bank Profits Higher

Commercial banks insured under the FDIC made a much better profit showing in 1939 than in the previous year, according to a study made by the American Bankers Association.

Net profits after dividends rose last year to 30 cents for each \$100 of deposits, as compared with only 15 cents per \$100 of deposits in the previous year.

Recoveries on previous losses and profits on securities sold increased somewhat in 1939, while losses and charge-offs declined.

Defense Problems

While the country is preparing for adequate defense and mobilizing both man power and industry for that purpose, many problems are created which are pushed in the background to give way to the more important job of the moment.

It is not out of place, however, to point out certain distinct dangers in the present situation to the entire capitalistic system, as we know it in this country, and to the liberties of the individual and private enterprise.

As patriotic Americans, we are all prepared to make any sacrifices necessary for the preservation of this country, its system of Government and its way of life. But in making them, we must see to it that those very sacrifices do not destroy what we are striving to defend.

A material proportionate increase in the national debt carries with it not only definite possibilities of inflation, but even short of that, would have a distinct tendency to upset our financial institutions. The banks and insurance companies of the country are already carrying too large a load of government obligations to adequately meet the needs of industry in case of any real upturn. The R.F.C. has taken over many of the functions of private financial institutions. The R.F.C. will probably have to finance many of the war industries plants built as a part of the defense program. What will happen to those plants after the emergency is past? Will they be taken over by private enterprise or will they be operated by the Federal Government to extend the field of government ownership and to add to the competition of government with private industry? Or will the plants be scrapped and their cost added to the public debt?

Increased taxes in the shape of excess profits taxes, as well as other levies, are inevitable in financing the defense program, and these, too, will add to the difficulties of private ownership and the probability is that still more appropriations will be made by Congress to mobilize the country.

Many of these things are necessary and accepted by the public during a period of emergency. For that reason, it is all the more important to hold down every possible government expenditure for other than defense purposes and for the government to withdraw wherever possible from competition with private industry and to safeguard its future. It is imperative that we cut out needless expense and repeal legislation which handicaps profitable operation of private enterprise.

Rail Income Improved

According to a report issued by the Association of American Railroads the end of July, the net railway income of class I railroads during the first six months of 1940 was more than \$242,000,000, as compared with only \$165,000,000 for the first six months of 1939. Operating expenses held at about the same level, although taxes were approximately \$17,000,000 higher than during the first six months of 1939.

(Continued on page 48)



SawMills

Frick Saw Mills Pay New Profits by turning timber into accurately cut lumber. **FASTER** because Frick mills are equipped with roller bearings and patented belt feed; **MORE EXACT** because they have set-works accurate to 1/32", also adjustable cut steel rack bars; **MORE PROFITABLE** because they save power, labor, and maintenance.

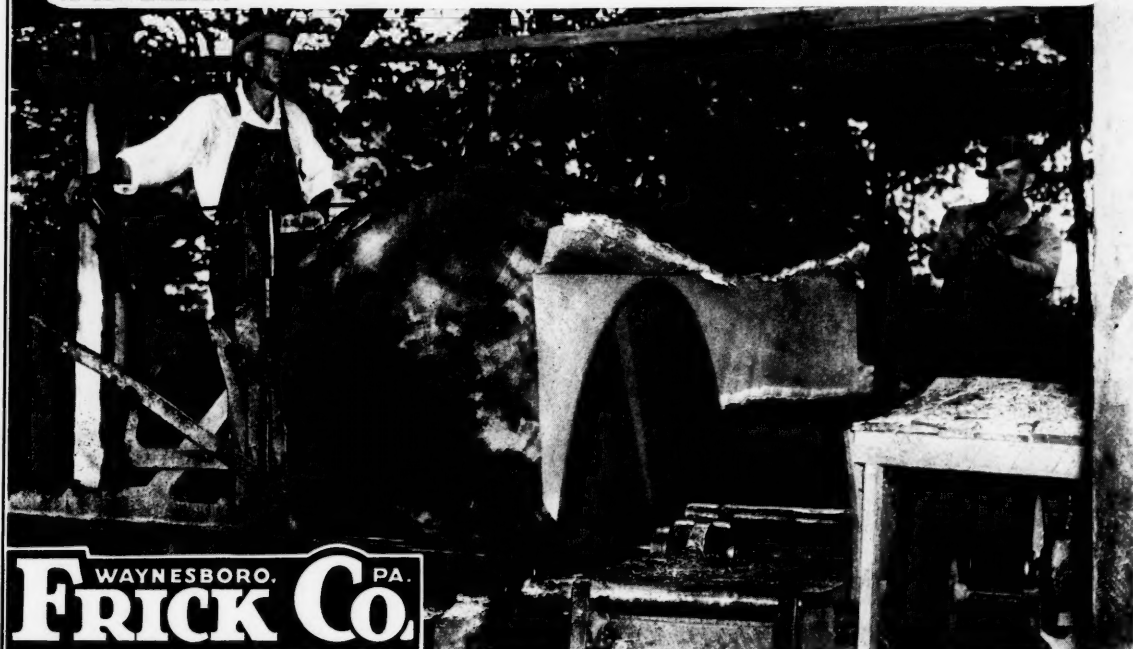
Ask for your copy of "Structural Details of Frick Saw Mill Machinery" available at all Frick Branches and Dealers.

BRANCHES AT:
Charleston, W. Va.
Dover, Delaware

Richmond, Va.
Salisbury, N. C.
Columbia, S. C.

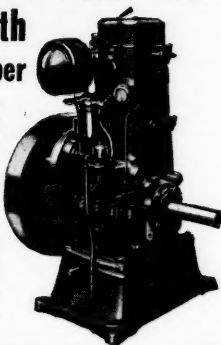
Atlanta, Ga.
Knoxville, Tenn.
Nashville, Tenn.

Montgomery, Ala.
Jackson, Miss.
Monroe, La.



STOVER Announces A NEW LINE of DIESEL ENGINES with Lanova Combustion Chamber

Smoother running. More power per cubic displacement and per pound, with proportionate lower cost. Available in 4 sizes and a variety of mounting bases. 7½ and 10 H.P. models are single cylinder. 15 and 20 H.P. are twin cylinder. Illustration shows conventional stationary type. Twin cylinder models have No. 1 Bell housing with enclosed flywheel. Write Dept. D98H for Bulletin No. 51 with complete information.



STOVER MFG. & ENGINE CO., Freeport, Ill.

We have helped

many businesses that have brought
us their financial problems.

Correspondence invited.

BALTIMORE COMMERCIAL BANK

GWYNN CROWTHER, President

BALTIMORE, MARYLAND

Member Federal Reserve System

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1905



THIRTY-
FIFTH
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REGISTERED TRADEMARK

FLEXIBLE SHAFTS AND MACHINES

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IN ALL PARTS OF UNITED STATES

SOUTH—EAST—NORTH—WEST

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**HIGH QUALITY MACHINES
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SIXTY TYPES AND SIZES
1/8 to 3 H.P.

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GUSHER
of SALES
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Satisfaction
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MYERS
DOUBLE
ACTING
CYLINDERS**

Today Myers brings you the most modern, the most dependable double acting cylinders on the market. There is nothing experimental about them. Designed by experts, built to precision standards, their reputation for dependable and economical service is firmly established in pump circles the country over.

Whether conditions are regular or otherwise, Myers Double Acting Cylinders satisfactorily solve most deep well pumping problems. They furnish the plus volume of water that lowers pumping costs and satisfies the most critical of users.

If you require more water from any source at lower cost than is possible to secure by ordinary methods write us for circular and complete information.

THE F.E. MYERS & BRO. CO.
ASHLAND, OHIO
 PUMPS - WATER SYSTEMS - HAY TOOLS - DOOR HANGERS

Finance and Industry

(Continued from page 46)

Reserves at New High

Reserve balances of the Federal Reserve Member Banks now stand at a new high level of nearly \$7,000,000,000. There is still very little evidence of "venture money" in spite of the prospect of huge war defense orders. As a matter of fact, corporate issues have reached a lower point during the summer months than at any time since late last fall. Business is marking time, waiting for some definite plan from Washington about the defense program and for some relief from restrictive legislation as well as the prospect of a sounder fiscal policy in the Federal Government.

Improved Profit Showing

In a recent dispatch of the Associated Press, it is stated that profits of the first 300 companies to report for the second quarter of 1940 were 37% greater than a year ago.

"The gain was made in the face of increased taxes for defense purposes, and despite the fact that most leading corporations charged added taxes for the entire first half against second quarter earnings."

Of the 300 companies, 219 reported better results than a year ago and the improvement was felt in all types of industry with the exception of food manufacturers. Steel made the most profitable second quarter showing since 1937. Railroad equipment makers, many of whom are still working on heavy backlogs of orders carried over from 1939 showed a profit for the second quarter three times that of the same period last year. Automobile production increased by 22% in the quarter just ended, with a small gain in earnings.

Municipal Bankruptcy Act Extended

The extended Municipal Bankruptcy Act, which President Roosevelt signed at the end of June, will make it possible for local governments with the consent of creditors to adjust their debts until June 30, 1942. The most significant change according to the Municipal Finance Officers Association is the inclusion of special districts and county governments hitherto omitted.

On February 1, 1940, a total of 734 cities and counties were in default while at the same time in 1939 there were only 324. In 1938 about 2% of all the local government units in the United States had defaulted on their obligations and only a few of these have reduced the principal of their debt since then.

Gold

At the present time the United States owns more than \$20,000,000,000 worth of gold or more than 75% of all the monetary gold in the world.

Nazi Germany does not consider gold as a necessary or even desirable medium of exchange, in spite of the fact that no satisfactory substitute has ever before been found. Hitler's military successes in Europe present the very definite problem, however, of what may be expected in any future adjustment which is bound to come.

It is also certainly obvious that no matter which side wins the European war a continued increase in our gold holdings to a point where this country owns practically all of the gold in the world will render that metal a useless medium of exchange for all practical purposes.

There is added to that problem in the meantime, the temptation on the part of the Federal Government to use its gold hoard to reduce the public debt which is growing at an alarming rate. That means inflation and brings up once more the questionable policy of arbitrarily paying a higher price for gold than the world market.

MANUFACTURERS RECORD FOR

low-cost merchandising to management executives



This is a suggestion to sellers of raw materials, factory or office equipment, insurance, building construction—anything management executives buy.

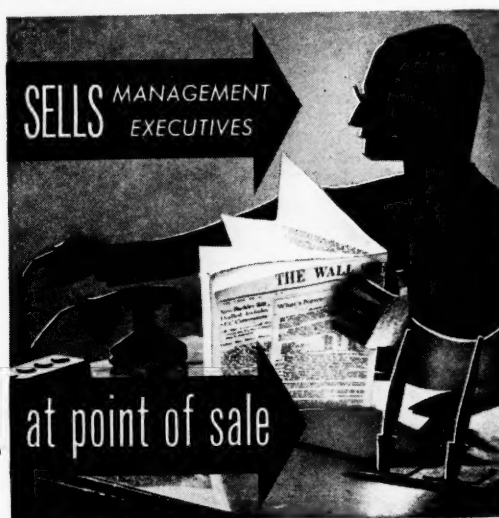
\$\$\$ You can get more out of your advertising investment in publications they read at home—more out of your salesmen's calls—by *merchandising* your story in offices.

\$\$\$ The office is where your prospect assembles further facts, talks with his associates, takes action.

\$\$\$ Leading national executive-publications are 39 to 88 per cent home-read—with one exception, The Wall Street Journal. As many as 86 per cent of its subscribers read it in their offices at their desks.

\$\$\$ On top of that, The Wall Street Journal is the world's most economical way of reaching active management-executives of companies with assets of over \$1,000,000.

WALL STREET JOURNAL



INDUSTRIAL NEWS

ASQU Asphalt Roofing

Announcing a new development in the asphalt roofing industry, Construction Materials Patents, Inc., Cincinnati, Ohio, have appointed The Philip Carey Company, Lockland, Cincinnati, the first licensee to manufacture asphalt roofing under the new patents. The roofing is identified by the name ASQU, and it is claimed that the process of manufacture makes possible the positive control of the roofing quality and uniformity throughout all stages of production. The major cause of the lack of uniformity, it is claimed, was incomplete asphalt saturation of the felt base of the asphalt shingles and roll roofings, determined after years of intensive research. This fault is said to have been overcome by the ASQU process which saturates the felt with asphalt to no less than 98½ per cent of its total capacity, as against a minimum standard of 85 per cent saturation required by the Underwriters' Laboratories. Advantages claimed for ASQU roofings are the practical elimination of severe blistering, sliding, and the loss of the protective mineral granule surface of the shingles. Three patents have been issued, one covering the product, one the process of manufacture, and one the equipment used in the process.

Norton Company Appointment

Norton Company of Worcester, Mass., announces the appointment of A. Oakleigh Bush as assistant chief sales engineer of its Abrasive Division. Joining the Norton Company about 16 years ago, Mr. Bush was first in the electric furnace plant at Niagara Falls and then in the Research and Sales Engineering departments at Worcester. In 1937 he was transferred to the Norton London office and later to the English plant at Welwyn, becoming its acting general manager in 1939. He returned to Worcester about a month ago with other American members of Norton Company's European staff.

Robert A. Hill Roebling Branch Manager

Announcing the appointment of Robert A. (Bob) Hill as branch manager of the Southwest territory, John A. Roebling's Sons Company, Trenton, N. J., states that Mr. Hill will have charge of sales and local stock of Roebling's complete line which includes wire rope, electric wires and cables, cold rolled flat wire and specialties, and woven wire fabrics. His territory will embrace Texas, Oklahoma, Louisiana, lower Mississippi, and oil producing sections of New Mexico. A native of the Southwest, Mr. Hill worked his way through Rice Institute. He has been associated with the oil industry for nearly twenty years, and has recently served as Mid-Continent manager for Regan Forge and Engineering Company. Prior to that, he was Division Manager for Broderick and Bascom Wire Rope Company.

Norton Company Promotes Clark and Holmstrom

The board of directors of the Norton Company, Worcester, Mass., announces the election of Harry K. Clark as vice president and general manager and Andrew B. Holmstrom as vice president and works manager. Mr. Clark's appointment fills a vacancy caused by the resignation of Aldus C. Higgins, president, who also held the office of general manager. Mr. Higgins resigned the office of general manager but retains the presidency. Mr. Holmstrom fills a vacancy caused by the resignation of George N. Jeppson as works manager. Mr. Jeppson is also treasurer and vice president and will retain these offices. Mr. Clark, who has held various positions with the company, has been connected with it for 25 years, while Mr. Holmstrom has been with it for 20 years and has considerable experience as an engineer and in plant management.

Illinois Industrial-Agricultural Promotion Campaign

In line with an advertising campaign for the promotion of agriculture and industry in Illinois, the Illinois Development Council, Springfield, has scheduled its initial advertisements for business and trade magazines, gearing the advertisements to the requirements of industries reached through trade publications, and speaking of their specific needs in their own language. The first advertisement in MANUFACTURERS RECORD appears in this issue and features advantages which Illinois offers. The Council's advertising campaign is being handled by the E. H. Brown Advertising Agency of Chicago.

Electrical Engineering Exposition

Scheduled for the same week as the mid-winter meetings of the American Institute of Electrical Engineers, January 27 to 31, an Electrical Engineering Exposition, the first of its kind, will be held in Convention Hall, Philadelphia, Pa., under the management of the International Exposition Company, Grand Central Palace, New York City. Exhibits will include new and improved electrical products for the generation, transmission and utilization of electric energy. As many as 180 spaces have been laid out for the accommodation and convenience of the Exposition.

The advisory committee of the Electrical Engineering Exposition includes the following: J. T. Barron, Vice President; Electric Operation, Public Service Electric & Gas Company; Walter S. Finlay, Jr., Vice President, J. G. White Engineering Corporation; E. S. Fitz, General Manager, Electrical Department, Virginia Electric & Power Company; N. E. Funk, Vice President, Engineering, Philadelphia Electric Company; C. W. Leiby, Editor, "Electric Light and Power"; A. L. Penniman, Jr., General Superintendent, Electric Operations, Consolidated Gas, Electric Light & Power Company of Baltimore; W. A. Perry, Superintendent, Electric and Power Departments, Inland Steel Company; R. C. Roe, Burns & Roe; Charles F. Roth, Manager, Exposition; E. K. Stevens, Manager, Exposition; R. W. Wilbraham, Chief Electrical Engineer, United Engineers & Constructors, Inc.; S. B. Williams, Editor, "Electrical World."

(Continued on page 52)

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Fabricators of:

Structural steel bridges, buildings, tanks, general plate work, barges, towboats, large cargo vessels, passenger vessels, tankers and refinery equipment.

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are behind the service of Eppinger and Russell Co. Industrial and commercial lumber of all kinds is made immune to termites and dry rot by pressure-treating with ZMA or Creosote. Consult Eppinger and Russell Co. on your requirements in poles, posts, piling, cross ties, cross arms and other timber. It will add 8 to 20 times the natural life to any woods you have treated by this low-cost, dependable process.

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Filtration and Pumping Equipment

For Water Works and Swimming Pools
Sales and Installation

BURFORD, HALL AND SMITH

140 Edgewood Avenue, N. E.,
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Bristol Steel & Iron Works, Inc. STRUCTURAL STEEL

For Buildings, Bridges and All Industrial Purposes
BRISTOL, VIRGINIA-TENNESSEE

District Sales Offices:

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501 Public Service Bldg.,
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Chemical Stoneware:

ALL TYPES CHEMICAL BRICK AND SHAPES.
SPIRAL, DIAPHRAGM, & RASCHIG RINGS.

PLANTS: DAISY, TENN.; ADAIRSVILLE, GA.;
NORWOOD & GULF, N. C.

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Quarry Tile:

ALL TYPES QUARRY FLOOR AND WALL TILE.
ROOF TILE AND FACE BRICK.

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CHARLOTTE, N. C.

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from STEEL · BRASS · STAINLESS-STEEL
May we solve your screw machine problems?

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LARGEST PLANT IN THE SOUTH DOING
HOT DIP GALVANIZING

BUSH ST. & B&O RR, BALTIMORE, MD.
 GALVANIZED PRODUCTS FURNISHED

FINE GEARS of all Materials—All Types and Sizes
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 Worm gears any practical size. Racks curved or straight. Fast Delivery—Fair Prices.

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CRUSHED STONE

Only highest grades of crushed
LIMESTONE AND GRANITE
 Meeting all specifications

CAPACITY—8000 tons daily

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NEW Sewer and Culvert Construction

By making concrete pipe on the job with Quinn Forms you give men more work, can use less experienced labor and produce uniform concrete pipe of highest quality. Recognized standard of all concrete pipe.

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Quinn Heavy Duty and Medium Duty Pipe Forms best for hand or wet process pipe. Give more years of service. All diameters—12 to 84 inches. Tongue and groove or bell end pipe, any length.

WRITE for New Book on Concrete Pipe giving information and prices, valuable tables on production costs, strength tests, Pipe Forms, Pipe Machines, etc. Book sent free.

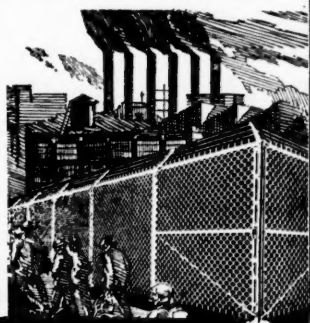
QUINN WIRE & IRON WORKS QU. 12 St. Boone, Iowa

The Chain-link Fence Corp.



Heavily galvanized after weaving, resists corrosion. Hercules H-1 posts, strongest, heaviest, unbreakable arms, form backbone of good fence.

Gates, with fool-proof latch bars, ball and socket hinges, built to withstand severe use and abuse. MFRS. and ERECTORS. Agents everywhere. Catalogue. 1620-40 West 31st Street, Chicago. U. S. A.



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FOR BRICK, TILE AND BLOCK,
 FROM SMALLEST TO LARGEST CAPACITY

Write for information

J. C. STEELE & SONS, STATESVILLE, N. C.

GALVANIZING

Have it done by Philadelphia's OLDEST,
 the Country's LARGEST

—HOT DIP JOB GALVANIZER—

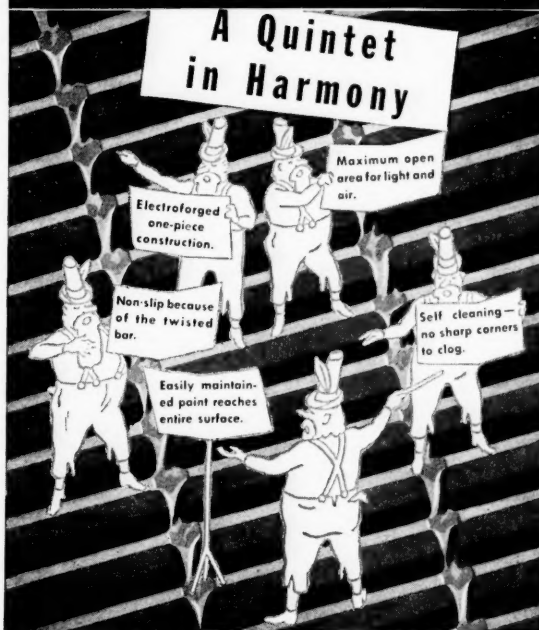
Joseph P. Cattie & Bros., Inc.

Gaul & Letterly Sts., Philadelphia, Pa.

GALVANIZED PRODUCTS FURNISHED

Blaw-Knox GRATING

A Quintet in Harmony



FREE

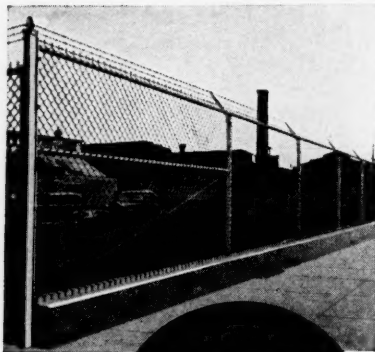
Paper weight size sample... Just fill in and mail the coupon.

BLAW-KNOX DIVISION of Blaw-Knox Co.
 Farmers Bank Bldg., Pittsburgh, Pa.
 SEND GRATING SAMPLE TO

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Safe

FROM
SABOTAGE
TRESPASSERS
TROUBLE-MAKERS



**ANCHOR
FENCE**

Resists

**FORCE, ALWAYS STAYS
IN LINE, QUICKLY INSTALLED**

Wise executives today are profiting from the experience gained during a similar war period 25 years ago, and are protecting their plants against sabotage, trespassers, trouble-makers with rugged, sturdy Anchor Fences.

Anchor Fences protect plants from costly interruptions to production schedules; keep profits from being wiped out. Give your plant adequate protection—by installing Anchor Fence, by adding sections at strategic points or by extending your fencing to protect new additions to your plant. In case of future plant expansion, Anchor Fence can easily be moved to new locations to provide necessary protection there.

Anchor's Nation-Wide Erecting Service is prepared to install your Anchor Fence immediately. Send for the Anchor Fence Engineer today. He will recommend the proper Anchor Fence installation to completely protect your plant, and show you the many Anchor features which give you extra protection and longer life. Or mail the coupon now for free Industrial Fence Catalog.



MAIL COUPON NOW!

Anchor Post Fence Co.
6622 Eastern Ave.,
Baltimore, Md.

- ☐ Please have Anchor Fence Engineer call.
☐ Send illustrated Industrial Fence Catalog.

Name.....

Firm.....

Address.....

INDUSTRIAL NEWS

(Continued from page 50)

Will Handle G-E Products

General Electric Company, 570 Lexington Avenue, New York City, announces the appointment of the Mid-State Electrical Supply Company, Inc., Lynchburg, Va., as distributor for General Electric wiring materials, insulating materials, and G-E Deltabeston wires and cables. The company will continue to handle G-E electric clocks and heating devices as in the past.

The Graves Electric Supply Company of Greenville, S. C., distributor for G-E automotive products, Deltabeston wires and cables, insulating materials and wiring materials, has been appointed a distributor for G-E electric clocks and heating devices also.

In addition to distributing heating devices, the Electric Time Company, Inc., New York City, will add G-E fans to its line.

Frick Opens Southern Branch

The Frick Company of Waynesboro, Pa., announces that a branch of its Farm Machinery Division has been opened at 410 West Walnut Street, Goldsboro, N. C., with J. B. Lamb as manager aided by a staff of assistants. In the new branch there is ample room for the display of equipment in the main building, which also contains offices and the stock room for parts. There is also space for parking and loading. The Frick line of farm machinery embraces tractors, threshers, combines, peanut pickers, balers, silo fillers, feed mills, pick-up cutters, manure spreaders, saw mills, edgers, trimmers, power units, boilers, engines and accessories.

Maurice Eckley Mutchler

Prominent in the promotion of the marine industry, Maurice Eckley Mutchler, General Sales Manager of the Sterling Engine Company, Buffalo, N. Y., died on July 22 at his home at Kenmore, N. Y. He was 51 years old. Born at Easton, Pa., Mr. Mutchler attended schools in Pennsylvania, Ohio and Buffalo, pursuing special evening studies in art subjects at Albright Art Gallery, at the end of which he won a scholarship for a year's study in a New York art school. He became associated with the Sterling organization in 1913 and rose to the position he held at his death. Long a well known figure in his field, he had many friends in nation-wide boat, marine and yachting circles. He is survived by his mother, widow, two daughters, one son, and two sisters.

US Electric Welder Corporation

J. L. Fosnight has acquired complete control of the USL Electric Welder Division and has incorporated a new company—the US Electric Welder Corporation, 1224 West Bancroft Street, Toledo, Ohio—of which he will serve as president and general manager. The USL Welder will be sold under the trade name of US Welder. Mr. Fosnight has been associated with the Electric Auto-Lite Company for more than 24 years as sales manager of the USL Welder Division.

Grinnell Makes Fleming Vice President and Manager

Associated with the company since 1919, James D. Fleming has been appointed Vice President and Sales Manager of Grinnell Company, Inc., Providence, R. I. Prior to this appointment, Mr. Fleming was Vice President and Manager of Grinnell Company of the Pacific, a subsidiary. He will continue to manage the Pacific company, but will be located at the company's home office at Providence.

TRADE LITERATURE

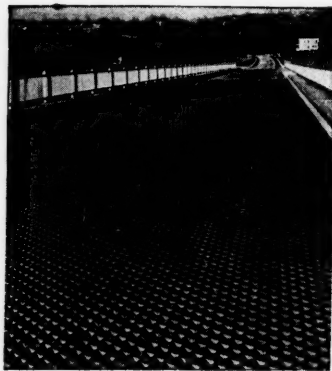
COLD FINISHED BARS—

Bulletin—illustrating and describing Ryerson Cold Finished Steel Bars, with chemical analysis, working properties, suggested applications, and other data.
Joseph T. Ryerson & Son, Inc., Chicago, Ill.

ASPHALT ROOFING—

Booklet—"More Roof Value for Your Money," explaining a new development in asphalt roofing, the new product being identified by the name ASQU, produced by a process that makes possible, it is claimed, the positive control of the roofing quality and uniformity "hour by hour in its manufacture."
Construction Materials Patents, Inc., Cincinnati, Ohio.

NOT A PENNY for MAINTENANCE



Cairo Approach N. Y. State Hy. Dept.
Catskill, N. Y. Engineers

The above KERLOW BRIDGE FLOOR was installed in 1936. Engineers report Kerlow flooring has been free of all maintenance, even including snow removal. For your next Bridge Floor (old or new) specify KERLOW proven floors.

All types of Industrial Floors and Safety Steps.

Agents in all principal cities.

Write for special technical data

KERLOW STEEL FLOORING CO.

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Easier typing! Better typing! With MAGIC Margin and other sensational Features of the Future. See this new Easy-Writing Royal now... Try it... Give it THE DESK TEST.

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ROYAL WORLD'S NO. 1 TYPEWRITER

SHOP AND OFFICE STEEL EQUIPMENT—
Folder—illustrating and describing steel equipment for shop and office to meet all needs, the publication pointing out that the "One Stop" Service, as offered by the A-S-E line of equipment, covers filing equipment, storage and wardrobe cabinets, lockers, and shop boxes for efficiently handling small parts in production and storage.
All-Steel Equip. Company, Incorporated,
Aurora, Ill.

GOODALL MECHANICAL RUBBER—
Catalog No. 207—48 pages, attractively bound, covering approximately 275 brands and specifications, of which 74 are new and not covered in former Goodall catalogs; presenting 142 illustrations of which 89 are new, and giving complete tabular data, including weights, for 58 items, while most of other products have partial tabular data; there are 7 basic price lists and 3 pages of technical tables; also many new items and brand names about which little has been written.

Goodall Rubber Company, Incorporated,
Philadelphia, Pa.; Southern branch office at Houston.

THERMOCOUPLES—
Catalog N-33A(6)—described as the first complete publication on thermocouples issued by Leeds and Northrup Company, listing and illustrating not only a comprehensive line of assemblies with their parts and accessories, but including information of general usefulness on the correct choice of couples, tabulated in easy-to-use form.
Leeds and Northrup Company, Philadelphia, Pa.

FIRE PREVENTION—
Booklet—educational treatise on fire prevention and its cause, presenting new and useful information on principles of combustion, volatile liquids, spontaneous ignition, preventing or stopping combustion, principles of extinguishing fire, classification of fires, successful extinguishing agents, inspection and repair of extinguishers, helpful suggestions for fire-proof construction, and general discussion; publication priced at 25 cents.
Harold Joe Davis, B. Sc., Safety Engineer,
3927 East Admiral Place, Tulsa, Okla.

HANDBOOK of Procedure and Practices Under the National Labor Relations Act—This publication was prepared under the direction of W. A. Rinckhoff, L.L.B., in collaboration with Harvey B. Rector, authority and consultant on labor relations, and is published by Law Research Service, 712-714 Keith Building, Cincinnati, Ohio. It is priced at \$7.50 per copy, with supplementary service, and additional copies for the use of foremen and supervisors at \$3.50 per copy.
Service offered is "intended to be a medium," according to the preface of the book, "through which the National Labor Relations Act may be correctly interpreted or availed of successfully by attorneys to enable them to protect the constitutional rights of employers of labor against wrongful charges of labor unions, and at the same time to enable the employer to prepare his defense against the evidence supporting such charges—evidence, which, if not overcome must warrant complaints." Information presented in the publication is based upon actual experience with labor organizations and the National Labor Relations Board, in successful preparation, prosecution and defense of alleged violations under the Act.

MINES Register—This is the 1940 edition (Volume XX) of the Mines Register, successor to the Mines Handbook, and is recently off the press of Atlas Publishing Company, New York City. It is 6 by 9 inches, contains 942 pages, and is priced at \$25.00 a copy post paid.

Dealing with the non-ferrous metal mining companies in the Western Hemisphere, the new edition notes the many changes that have taken place in the three intervening years since the last issue was published, carefully checking them, so that the 1940 edition presents a complete revision of the previous issue with the latest authentic information. It contains a description of more than 7,000 active mining companies in the United States, Canada, Mexico and South America and lists more than 24,000 inactive mines. The total represents an increase of more than 30 per cent compared with the number listed in the 1937 edition. For convenience, the new edition has been divided into four sections: Section 1, describing active mining companies in the Western Hemisphere; Section 2, describing some of the largest mining companies in different parts of the world; Section 3, the addenda giving information on mining companies that arrived too late for classification in Section 1; Section 4, listing inactive or dormant mines. There is also a comprehensive statistical section dealing with metal production, consumption, imports, exports, price trends, etc.

AUGUST NINETEEN FORTY

TONIGHT

They're Playing Under Lights!

by Westinghouse



public has taken night baseball to its heart.

- In 1939, for instance, nearly one million persons attended major league night baseball games. The night games at Shibe Park, Philadelphia, topped the daytime attendance average five to one. In Comiskey Park, Chicago, the first six night games drew over 188,000 paid admissions.

- There has been similar enthusiastic response to night games played in the Polo Grounds, New York; Sportsman's Field, St. Louis; Forbes Field, Pittsburgh; as well as those at other baseball parks.

- Consider if you will the unusual demands of a lighting system that must provide glareless illumination for a fast night baseball game.

- At Forbes Field, Pittsburgh, our most recent installation, more than 210 million candlepower of light is spread over the field from 864 floodlights, each of some 1500 watt capacity. Their combined output would be enough to light every home in a city of 25,000 population. If this light were concentrated in a single unit it would make a newspaper readable more than 18 miles away. Distributed as it is, the illumination over Forbes Field is 19 times brighter than the average business man's desk.

- Fortunately, we at Westinghouse were able to bring to this exacting problem a long and highly varied lighting experience. Through the important contributions we have made to better lighting, stores have been made more attractive to shoppers; factories and offices more efficient for employees; school rooms more conducive to study; public thoroughfares, airports and river docks infinitely more safe.

- Few fans ever dreamed the day would come when after dinner they could ride out to a stadium and watch a professional baseball game played under lights.

- Yet, the idea of night baseball was advanced as early as three decades ago. True, nothing was done about this so-called "fantastic dream" then. But twelve years ago, a minor league club toured the country with a portable lighting system and played before fans at night in much the same manner as a carnival troupe.

- Night baseball at last became a reality. And it proved increasingly popular, evidenced by the fact that in the past ten years it has developed in the minor leagues to a point where seven games out of every ten are today played under lights.

- In 1935 night baseball graduated to its first major league park. So rapidly has it caught on here that eight of the big league parks are now equipped with the most modern lighting facilities. And we are proud to say that five of these lighting systems were designed and installed by our own company.

- One has only to check the turnstiles to appreciate how eagerly the

Defense Program Awards in the South

(Continued from page 37)

Chemical Warfare		National Lead Co., Baltimore	Solder	7,106.00		
Qtmtr. Corps		Casey Jones, Inc., Baltimore	Working suits (Gov't material)	19,075.00		
"	"	Construction—Edgewood Arsenal	Processing plant—ammunition loading plant—application plant	1,261,758.00		
"	"	Construction—Edgewood Arsenal	Whses—magazines—utilities	310,000.00		
"	"	Construction—Edgewood Arsenal	Roads - magazines - bldgs—utilities	918,988.00		
Chemical Warfare		National Lead Co., Baltimore	Solder	24,037.50		
"	"	Wm. E. Hooper & Sons, Co., Baltimore	Cotton duck	20,037.50		
"	"	Mt. Vernon-Woodberry Mills, Baltimore	Cotton duck	28,450.00		
"	"	Maryland Oxygen Co., Baltimore	Acetylene	551.20		
Qtmtr. Corps		S. Rosenbloom, Inc., Baltimore	Cotton shirts, khaki	32,426.80		
"	"	Mt. Vernon-Woodberry Mills, Baltimore	Cotton duck—water repellent	36,250.00		
"	"	Commercial Bag Mfg. Co.—Baltimore	Burlap	12,163.20		
"	"	Enterprise Electric Co., Inc., Baltimore	Night lighting, Phillips Field, Aberdeen	1,035.00		
Ordnance		Koppers Co., Bartlett Hayward Div., Baltimore	Gun carriages	3,724,930.00		
Supplies & Accts.		Engineering & Research Corp., Riverdale	Blades for test clubs	81,100.00		
"	"	S. Rosenbloom, Inc., Baltimore	Shirts	32,725.00		
"	"	Mt. Vernon—Woodberry Mills, Baltimore	Canvas	39,750.00		
	No.	Type	Contractor	Yard	Unit Cost	
Maritime Comm.	1	Tanker	Bethlehem Steel Co.	Sparrows Point	Launched	3,129,667.00
"	6	Tanker	Bethlehem Steel Co.	Sparrows Point	Under const.	2,687,000.00
"	1	C1-B Cargo	Bethlehem Steel Co.	Sparrows Point	Launched	1,889,000.00
"	4	C1-B Cargo	Bethlehem Steel Co.	Sparrows Point	To be built	1,889,000.00
"	2	Pass.-Cargo	Bethlehem Steel Co.	Sparrows Point	Launched	3,168,000.00
"	3	Pass.-Cargo	Bethlehem Steel Co.	Sparrows Point	To be built	3,075,000.00
"	2	Cargo	Bethlehem Steel Co.	Sparrows Point	Under const.	2,140,000.00
"	1	Cargo	Bethlehem Steel Co.	Sparrows Point	To be built	2,140,000.00
"	3	Cargo	Bethlehem Steel Co.	Sparrows Point	Under const.	2,250,000.00
"	1	Ship	Bethlehem Steel Co.	Sparrows Point	Recondition	1,644,640.00
"	1	Ship	Bethlehem Steel Co.	Sparrows Point	Recondition	124,800.00
MISSISSIPPI						
Qtmtr. Corps		Shuptrine Construction Co., Leakesville	Site clearance, Southeast			
"	"	Hunter Thomas, Inc., Tupelo	Air Depot		7,296.00	
"	"		Cotton khaki shirts		7,437.50	
Maritime Comm.	No.	Type	Contractor	Yard		
"	1	C-3 Cargo	Ingalls S. B. Corp. Birmingham, Ala.	Pascagoula, Miss.	Launched	2,600,000.00
"	3	C-3 Cargo	Ingalls S. B. Corp. Birmingham, Ala.	Pascagoula, Miss.	Under Const.	2,600,000.00
"	1	C-3 Pass.-Cargo	Ingalls S. B. Corp. Birmingham, Ala.	Pascagoula, Miss.	Under Const.	4,092,183.00
"	3	C-3 Pass.-Cargo	Ingalls S. B. Corp. Birmingham, Ala.	Pascagoula, Miss.	To be built	4,092,183.00
MISSOURI						
Qtmtr. Corps		MacDonald Constr. Co., St. Louis	Bldgs., group "B"—Canal Zone		402,442.00	
"	"	Int. Shoe Co., St. Louis	Service shoes		235,696.32	
"	"	Brown Shoe Co., St. Louis	Service shoes		150,000.00	
"	"	Neevel Mfg. Co., Kansas City	Trunks, lockers		106,920.00	
"	"	International Shoe Co., St. Louis	Garrison shoes		159,345.25	
"	"	Premium Cap Co., St. Louis	Working hats		9,180.00	
"	"	Gen. Fireproofing Co., St. Louis	Storage shelving in hospital, Scott Field, Ill.		1,221.82	
"	"	A. Fromhold—Kansas City, Mo.	Night lighting set—Sherman Field, Kansas		1,391.97	
NORTH CAROLINA						
Qtmtr. Corps		J. A. Jones Constr. Co.—Charlotte	Constr. misc. bldgs. — Canal Zone		215,670.00	
"	"	Dixon Constr. Co., Fayetteville	Radio bldg.—Pope Field		3,694.00	
"	"	Marshall Field & Co., Mfg. Div., Spray	Uniform cloth		90,910.00	
"	"	Army Construction—Pope Field	Barracks—utilities		90,000.00	
"	"	The Corbitt Co., Henderson	22 trailers		30,424.58	
"	"	Chatham Mfg. Co.—Elkin	Wool blankets		723,750.00	
"	"	Leaksville Woolen Mills—Charlotte	Wool blankets		59,500.00	
"	"	Marshall Field & Co., Spray	Wool blankets		88,125.00	
"	"	Ragan Knitting Co., Inc., Thomasville	Cotton socks		9,780.12	
"	"	Marshall Field & Co., Spray	Cotton sheets		30,456.00	
"	"	P. T. Withers—Gastonia	Booster pumping Station—Ft. Bragg		6,490.00	
"	"	Southern Electric Service Co., Charlotte	Pumping equipment—Ft. Bragg		910.00	
Yards & Docks		T. A. Loving & Co., Goldsboro	Quarters-Naval Air Station—Jacksonville, Fla		767,500.00	
OKLAHOMA						
Qtmtr. Corps		B & M Constr. Co., Oklahoma City	Additions to water systems —Fitzsimmons Hospital —Denver, Colorado		14,466.20	

(Continued on page 56)

(Continued on page 56)

TANK HEADS

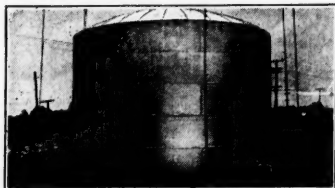
ALL STYLES TO
60" DIAMETER
ONE OR A CARLOAD

Catalog on request

THE COMMERCIAL SHEARING & STAMPING CO.
YOUNGSTOWN, OHIO

SOUTHLAND PRODUCTS

—WELDED OR RIVETED—



We now manufacture and offer to the trade tanks in all sizes for pressure or gravity work. Also other steel equipment of either

WELDED
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CONSTRUCTION

This applies to field as well as shop built equipment.

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CHATTANOOGA BOILER & TANK CO.
CHATTANOOGA, TENN.

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PILING, POLES, LUMBER, TIES
CROSS ARMS and CONDUIT

ALSO

WOLMANIZED AND CHROMATED ZINC CHLORIDE
TREATED LUMBER

Decay and Termite Proof—Can Be Painted

Docks for Ocean Vessels

American Creosote Works, Inc., New Orleans, La.
Atlantic Creosoting Co., Inc.

NORFOLK SAVANNAH NEW YORK

Plants at: New Orleans; Winnfield, La.; Louisville, Miss.
Savannah, Ga.; Jackson, Tenn., and Norfolk, Va.

DAVIS

CYPRESS TANKS

ALL TANK REQUIREMENTS

are served by cypress tanks which last indefinitely, and we have been installing them throughout the South for over 50 years. Send us your inquiries for wood pipe. Ask for catalogue.



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P. O. Box 5, Palatka, Florida

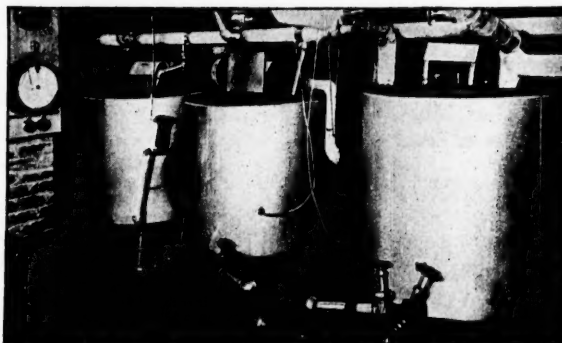


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Elevated Tanks	Bins
Pressure Tanks	Extractors
Steel Storage Tanks	Barges
Process Tanks	Dredge Pipe and Accessories
Butane—Propane Tanks	Welded Pipe
Standpipes	Riveted Pipe
Retorts	

*General Steel Plate Construction
designed for your requirements.*

Lancaster Iron Works Inc.
Lancaster, Pa.



Section of Battery built for Lanett Mills of West Point Mfg. Co., West Point, Ga.

Nickel-Clad Starch Kettles

Fifteen starch kettles were made by us on this special job. These sizing kettles are made of Nickel-Clad steel to eliminate cracks and provide corrosion resistance. Monel metal agitators and heating coils were installed inside for greater strength, toughness, and freedom from contamination or discoloration of product. Welded construction throughout.

Starch boxes, kettles, jig boxes, etc., of Nickel-Clad steel as well as other metals made to order.

• Write for "Tank Talk"—No. 20-D.

R. D. COLE MANUFACTURING CO.

ESTABLISHED 1854

NEWNAN GEORGIA

Defense Program Awards in the South

(Continued from page 54)

"	"	B & M Constr. Co., Oklahoma City	Night lighting—Post Field	3,976.00
Supplies & Accts.		Spartan Aircraft Co., Tulsa	Airplanes	1,859,880.80

SOUTH CAROLINA

Qtmtr. Corps		A. Southworth, Charleston	Smoke Pipe connections— Ft. Moultrie	1,340.00
Chemical Warfare		Southern Weaving Co.—Greenville	Webbing	16,600.00
		Simons—Marrant Co., Charleston	Bldgs — Charleston Navy Yard	390,000.00
Navy	No.	Type	Contractor	
"	4	Destroyers	Charleston Navy Yard	Under construction
"	5	Destroyers	Charleston Navy Yard	To be built

TENNESSEE

Qtmtr. Corps		General Shoe Corp., Nashville	Service shoes	116,325.00
"	"	General Shoe Corp., Nashville	Service shoes	146,100.00
"	"	Springfield Woolen Mills—Springfield	Wool blankets	173,918.00
"	"	Stein-Way Clothing Co., Erwin	Trousers (Gov't material)	66,150.00
"	"	Nat'l Rose Spring Mattress Co., Memphis	Mattresses	20,625.00

TEXAS

Qtmtr. Corps		Eckert-Fair Constr. Co., Dallas	Warehouse — Barksdale Field	32,500.00
"	"	C. C. Cooke Co., San Antonio	Waterproofing magazines, Camp Stanley	1,369.50
"	"	C. L. Browning, Jr., San Antonio	Radio Bldg., Randolph Field	15,616.00
"	"	Wright Bros. Electric Co., San Antonio	Lamp Assembly Beacon, Brooks Field	1,282.00
"	"	At San Antonio Air Depot	Temporary Warehouse ..	405,000.00
"	"	At Camp Stanley	30 Underground magazines ..	405,000.00
"	"	At Kelly Field	Hangars-bldgs-utilities ..	990,000.00
"	"	At Brooks Field	Hangar, bldgs-utilities ..	708,000.00
"	"	Crawford-Austin Mfg. Co., Waco	Folding canvas cots	172,836.40
"	"	Taylor Bedding Mfg. Co., Taylor	Cotton Mattresses	107,734.38
"	"	Samuel Dean, San Antonio	Roofing & sheet metal work on magazines— Camp Stanley	13,218.00
"	"	John K. Schoeppl, San Antonio	Cement floor finishing, Camp Stanley	990.00
"	"	N. E. Busby & Co., Dallas	Additions to Night light- ing installations—Hens- ley Field	4,999.00
"	"	Robert E. Stevens, San Antonio	Excavations for bldg.— Duncan Field	3,747.00
"	"	Nelson Electric Co., El Paso	Emergency Set Installa- tions, Biggs Field	1,465.00
"	"	Prati & Griem, El Paso	Roads & walks, Fort Bliss ..	11,909.10
Supplies & Accts.		Crawford-Austin Mfg. Co., Waco	Folding canvas cots	8,333.45
	No.	Type	Contractor	Yard
Maritime Comm.	1	CI-A Cargo	Penna. Shipyard, Inc.	Beaumont
"	1	CI-A Cargo	Penna. Shipyard, Inc.	Beaumont
"	1	Cargo	Penna. Shipyard, Inc.	Beaumont
				Unit Cost
			Under const.	1,974,000.00
			To be built	1,974,000.00
			Recondition	141,965.00

VIRGINIA

Chemical Warfare		Virginia Rubatex Corp., Bedford	Outlet valves	52,900.00
Qtmtr. Corps		Langley Field Construction	Magazines barricades— roads	80,200.00
"	"	Langley Field Construction	Whse-shops-hangar - utili- ties	220,000.00
"	"	American Hardware Co., Petersburg	Trunks, lockers	103,350.00
Ordnance		Pollack Mfg. Co., Arlington	Fuze units — metal parts for	349,760.00
Yards & Docks		The Tredegar Co., Richmond	Target practice projectiles ..	19,228.00
"	"	Spencer, White & Prentis, NYC	Shipbuilding docks (Nor- folk)	8,175,000.00 (est.)
"	"	Rust Engr. Co., Pittsburgh, Pa.	Machine shop extension & cafeteria—Norfolk Yard ..	720,000.00
"	"	Va. Engr. Co., Inc., Newport News	Aviation shore facilities, Norfolk	12,700,000.00
"	"	Weddle & Co., Norfolk	Naval Hospital wards— Norfolk	165,000.00
"	"	Jeffress-Dyer Co., Washington, D. C.	Hangar-Dahlgren	225,000.00
"	"	American Automatic Electric Sales Co., Chicago, Ill.	Automatic telephone sys- tem Torpedo factory— Alexandria	8,570.12 (see Ill.)
"	"	Doyle & Russell—Richmond	Superstructure, repair shop Naval Air Station— Jacksonville, Florida ..	772,160.00
	No.	Type	Contractor	Yard
Navy	1	Battleship	Newport News SB & DD Co.	Newport News
"	1	Aircraft Carrier	Newport News SB & DD Co.	Newport News
"	3	Aircraft Carrier	Newport News SB & DD Co.	Newport News
"	2	Cruisers	Newport News SB & DD Co.	Newport News
				Cost
			Under const.	
			To be built	130,986,000.00
			To be built	38,545,000.00

(Continued on page 60)

5 big features make this Industrial Advertising Conference a "must" for you!



"CLINICS" . . . informal group discussions of "Tying in Advertising with Selling," "Getting Salesmen's Cooperation," "Direct Mail," "Measuring Results," "Market Information," "Copy Testing," "Programs that Management Will Approve," "Layout, Copy and Illustration," "Allocation of Budgets" and other problems. *Inside information on successful methods and campaigns, and an opportunity to have your questions answered.*



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RELAXATION . . . annual banquet, show, and dance . . . publishers' reception . . . opportunity to visit friends . . . program for wives, including trip through Ford's Greenfield Village.



CUSTOMER CONTACTS . . . you can visit important customers in Detroit plants, see your company's products being used, get first-hand reactions to advertising, take photographs for use in your 1941 advertising and sales promotion.

GOING TO BUY A NEW CAR? — You can save money by taking delivery in Detroit and driving it home.

Markets and selling conditions are changing. But profitable sales await those alert companies who study the trends and improve their practices. At this Conference you will get new ideas that will help you do a better, more efficient job, and make your 1941 advertising and sales promotion program more effective.

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18th Annual CONFERENCE and Exposition
National INDUSTRIAL ADVERTISERS Association
SEPT. 18, 19, 20 . . . DETROIT . . . HOTEL STATLER

South American Trade Losses

COLOMBIAN IMPORTS

(Continued from page 25)

Preserved fish in oils, sauces, etc.	23.4	75,325
Iron and steel sheets, varnished or not, bulky between 1/16 and 1/4 inches	15.0	56,925
Iron and steel sheets for roofing, plain or corrugated	26.9	254,725
Iron and steel, wrought in bars, squares, rods, etc. ...	37.8	355,350
Iron and steel, wrought in ingots, sheets, round, square, etc.	43.9	454,275
Silk yarn	59.2	546,250
Woolen yarn, dyed or plain	62.2	656,650
Other yarns and fibers	40.2	143,750
Cattle	0.7	4,600
Agricultural products, raw materials	18.2	729,675
Agricultural products, food	2.2	53,475

CHILE

In 1937, the major commodities of Chilean export totaling \$31,829,490 comprised 96 per cent of all exports. Of this amount, Germany, Italy, France, Belgium, Norway and Denmark purchased \$7,369,145 as follows:

<i>Exports</i>	
Copper bars (electrolytic) ...\$	1,035,440
Copper bars (standard)	613,480
Gold (except gold concentrates) and silver, ores, concentrates and precipitates with copper, or lead or zinc .	98,595
Lumber	62,300
Sheep's wool	\$79,340
Sheepskins	241,080
Cattle hides	95,095
Tripe	65,240
Oats	206,185
Barley	61,950
Beans, peas, lentils	680,855
Fresh and dried fruits and vegetables	94,675
Vegetable fibers	110,635
Brans and middlings	80,885

All Chilean imports, however, only amounted to \$15,015,000, yet Germany, Italy, France and Belgium together supplied \$6,122,655 as follows:

<i>Imports</i>	<i>Per Cent Imported from axis-occupied countries</i>	<i>Value</i>
Animal products, total	5.8	\$ 30,030
Beverages, (alcoholic) and mineral waters, total	57.8	10,710
Yarns and thread	16.7	126,245
Cotton, wool and silk cloth and mixtures	27.0	413,980
Chemicals	39.0	104,335
Drugs, medicinals, toilet articles	70	83,225
Explosives and mining fuses	56.5	73,990
Paints, colors, varnishes	68.6	154,420
Metals, semi and manufactures, except machinery and tools, total	47.2	1,017,835
Iron and steel bars, plates, sheets, tinplate and other semi-manufactures	35.7	342,090
Manufactures of iron and steel except machinery, tools and vehicles	57.8	387,485
Machinery and tools, all classes, total	40.2	850,815
Vehicles and parts, including tires, total	26.4	227,710
Automobiles	16.9	42,875
Automobile chassis	33.3	55,615
Glass, stone, ceramics and crystal	58.7	165,935
Paper and cardboard	37.4	99,820
Jewelry, watches, etc.	59.5	48,895
Scientific, musical and professional apparatus	38.4	154,595

O. W. Buening

The Westinghouse Air Brake Company of Pittsburgh, Pa., announces the death July 27 of O. W. Buening, Vice President in Charge of Manufacture, who succumbed in Beebe Hospital at Lewes, Delaware, after a brief illness. Mr. Buening had been spending a vacation at Rehoboth Beach. A native of Kansas, Mr. Buening entered the employ of

the Westinghouse Air Brake Company immediately after his graduation from Purdue University in 1901 with the degree of Bachelor of Science in Mechanical Engineering. He advanced rapidly through responsible positions and was elected Vice President in Charge of Manufacture in 1930. The Union Switch and Signal Company also elected him to a corresponding position that year, and he served in these positions until his death.

PERU

Of the Peruvian exports valued at \$69,433,000 in 1937, Germany, France and Belgium together purchased \$24,918,740 as follows:

<i>Exports</i>	
Wool	\$ 1,289,530
Other animal products	603,440
Cotton, raw	5,688,770
Other vegetable products	202,750
Gasoline	1,814,690
Crude petroleum	3,466,360
Other mineral products	834,100
Miscellaneous	11,020,000
Goods imported into Peru during 1937 totaled \$44,689,140, of which \$9,266,300 came from Germany, Italy, France, Holland, Belgium and Norway as follows:	

<i>Per Cent Imported from axis-occupied countries</i>	<i>Value</i>
<i>Imports</i>	
Cotton and manufactures	23.5
Wool, furs and feathers, and manufactures	25.4
Silk and rayon, and manufactures	64.2
Leather and manufactures	52.9
Metals and manufactures	32.6
Stone, earthen, ceramics, crystal and glass	46.6
Colors, gums, oils, paints, varnishes	17.5
Paper, cardboard and writing materials	31.1
Tools, naval articles, machinery	16.4
Arms, ammunition and explosives	44.3
Electrical machinery and apparatus	28.0
Sporting goods	27.9
Beverages, alcoholic and non-alcoholic, except tea and coffee	18.3
Pharmaceuticals, chemicals and drugs	33.4
Miscellaneous	36.7

New Pulp and Paper Mill Starts Construction in South

(Continued from page 36)

sure ample water supply for the estimated 6,000,000 gallons daily consumption.

The payroll during the period of construction of the mill is expected to total approximately \$300,000 with between 250 and 300 employed in the various building trades.

When in full operation, the mill will employ from 500 to 600 persons in the plant and in the forests, with a payroll for the mill of about \$400,000 and in the forests of about \$200,000 annually.

Using wood from its 125,000 acres at the rate of 34,000 cords of pulpwood annually, the mill will manufacture 25,000 tons of bleached sulphate wrapping paper, for which it has a guaranteed sale approximating \$2,000,000 annually.

The company is a \$3,750,000 concern, with 96,000 shares of common stock all held in Pensacola; \$734,000 worth of 5% preferred stock has already been issued and \$972,000 in 15-year 5% debentures will be issued, giving a mortgage of \$1,878,000 to the Reconstruction Finance Corporation for its loan.

The following concerns are supplying material and equipment:

The Babcock & Wilcox Company—boilers, recovery units, digesters.

Westinghouse Electric and Manufacturing Company—turbine, motors, electric drive.

The Black-Clawson Company—paper machine.

Pittsburgh Piping and Equipment Company—piping.

Swenson Evaporator Company—evaporators.

(Continued on page 61)

BELMONT IRON WORKS

PHILADELPHIA NEW YORK EDDYSTONE

Southern Sales Offices, Charlotte, N. C.

Engineers . Contractors . Exporters

STRUCTURAL STEEL
BUILDINGS AND BRIDGES
RIVETED-ARC WELDED
BELMONT INTERLOCKING
CHANNEL FLOOR

Write for Catalogue

Main Office—Philadelphia, Pa.
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STRUCTURAL for BUILDINGS and BRIDGES

Capacity 1000 Tons per Month. 3000 Tons in Stock

Carolina Steel and Iron Company

The Largest Steel Fabricators in the Carolinas

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North Carolina

S. C. Rep., Edward McCrady, 307 Allen Bldg., Greenville, S. C.

CONVERSE BRIDGE & STEEL CO.

Chattanooga, Tennessee

Structural Steel for all Industrial Structures,
Buildings and Bridges.

LARGE STOCK FOR IMMEDIATE SHIPMENT

CANNING MACHINERY

FOR

FRUITS-VEGETABLES-FISH-CITRUS FRUITS-ETC.

A.K. ROBINS & CO. INC. BALTIMORE, MD.
WRITE FOR CATALOGUE

THE MANUFACTURERS RECORD

is the only industrial publication that has devoted its entire existence to the objective

"the upbuilding of the nation through
the development of the South"



While cosmopolitan in its general appeal, and modern up to this moment in its equipment, there is a peculiar flavor of The Old South here which Southerners are quick to note and appreciate. They feel at home and come back to us again and again.

Rates \$3.00 per day and up. Every room with bath or shower. Centrally located.

The Southern Hotel
BALTIMORE

AUGUST NINETEEN FORTY



Pipe and Copper Shop, Navy Yard, Philadelphia, Pa. 20,000 sq. ft. White and 11,300 sq. ft. Actinic, Corrugated Wire Glass—side-wall and monitor construction.

SPECIFY ORIGINAL SOLID CORRUGATED WIRE GLASS

For side-wall construction with non-corrosive accessories of Aluminum or Copper. We can furnish fixed panels, center or top pivoted vents three lights wide or continuous top hung ventilating units.

Also used with excellent results for skylights, marquees, canopies or wherever daylight is needed.

Our Engineering Service Department will be glad to aid you on your daylighting problems. Write or wire.

PENNSYLVANIA WIRE GLASS CO.

1612 MARKET STREET
PHILADELPHIA, PENNSYLVANIA



LYONORE METAL is best,
because it's the

"FOUR ELEMENT ALLOY"



Lyonore Metal is fortified against the attacks of time and weather with FOUR ELEMENTS . . . two of which are the most corrosion-resistant, semi-precious elements known to science—CHROMIUM and NICKEL. It is manufactured in one of the world's largest mills according to the exclusive formula of this 79 year old concern. Lyonore Metal lasts many years longer, yet costs you but a trifle more. Write today for details.

Lyon, Clark & Co.

WASHINGTON

BALTIMORE

1860
Lyonore Metal

CHROMIUM - NICKEL - COPPER - IRON ALLOY

Materials Needed for Defense

(Continued from page 29)

submarines, balloons, gas masks, electric motors, ships, railroad trains, street cars, electric lights, telephones, typewriters, erasers, printers' rolls, wireless apparatus, radios, medical goods, industrial fire and garden hose, orchard spray tubing, milking machines, athletic goods, and several types of shoes. In addition, rubber is used but is not indispensable in the manufacture of several other commodities. The rubber stock on hand in this country has rarely exceeded six months' supply, and is generally half that, but due to an agreement with the United Kingdom, we are building a national stock pile by exchanging cotton for rubber. (An article concerning natural and synthetic rubber appeared in the April 1940 issue of the MANUFACTURERS RECORD).

SILK

Silk is used in the insulation of wires and cables, for powder bags for large caliber guns, and for making parachutes. However, the development of substitutes has progressed to a remarkable degree, and the only use for silk for which no suitable substitute has been found is as material for powder bags, especially for naval use, as large caliber guns are used in close quarters in the Navy, and under conditions requiring a clean and full-burning powder container. These bags are made from waste silk, a fair-sized stock of which is kept on hand by the armed forces. The total annual world production of silk is over 100,000,000 pounds, of which the United States consumes 75 percent, three-fourths of it being supplied from Japan.

TIN

Tin, with its almost unique ability to form thin, ductile, non-corrosive and closely adhering films on steel and other metals, its anti-friction properties and its ability to act as a flux in binding one metal to another, presents a serious strategic mineral problem as the metal is indispensable for numerous purposes and domestic production during the period 1901-38 has been less than 0.1 percent of national consumption. Its uses include the protection of food (through so-called tin cans), manufacture of automobiles, bearings, solder, bronzes and gun metals. It

is also rolled into foil and has many uses as a chemical. Only a very small part of our needs can be reduced by substitutes or recovery from scrap metals having a tin content. An analysis of tin consumption shows that tinfoil accounts for 41 percent, solder 22 percent, babbitt 8 percent, bronze 7 percent, collapsible tubes 4 percent, galvanizing, type metal, foil, tinning, terneplate, and chemicals each approximately 2 percent. Under normal conditions the United States consumes 75,000 long tons annually, or about 45 percent of the total world production.

TUNGSTEN

Tungsten, the heaviest of the base metals, has the highest melting point and the highest modulus of elasticity of all metals. It is used for high speed tool steel, lamp filaments, non-ferrous alloys, electric contacts and electrodes, and for various purposes in the chemical industry. A strictly military use is as an alloy in armor-piercing bullets. China and Burma are the world's foremost tungsten producers, though in 1938, the United States produced 4,000 tons of concentrates (60 per cent WO₃) which compares with a normal consumption estimated between 4,500 and 5,000 tons. During the last 14 years imports totaled 50 per cent more than domestic production. Tungsten does not present as great a problem as do some other strategic materials, not only because we produce enough to take care of some of our needs, but molybdenum serves in some uses, including high speed tool steel.

Richmond's Deepwater Terminal

(Continued from page 27)

Highway and purchase of land, is \$1,750,000, of which Richmond is paying 55 per cent and the Public Works Administration the balance. The entire river project will cost approximately \$6,000,000 before all is ready for business. Work on the Terminal alone is provided an estimated total of 3,990,000 man-hours of labor. Of this, 1,140,000 hours are spent at the site, and 2,850,000 are indirect man-hours spent in the fabrication and manufacture of materials. It also has been estimated that from 200 to 800 men were employed at various periods during construction.

The Terminal is linked with the Capital of the Old Dominion by a new 120-foot State Highway. The thoroughfare is now under construction on Ninth Street, South Richmond, the most direct route to the harbor. Running to a point 4,000 feet from the Terminal, it will meet another strip of concrete leading directly to the port facilities. At the harbor itself are the turning basin for ocean-going vessels up to 650 feet in length; the huge wharf wall, warehouses, transit sheds, rail and highway connections and other terminal facilities.

The 1,725,000 cubic yard turning basin is costing \$345,000 and the 1,250 linear feet concrete wharf wall, \$470,000. Seven miles of rail connections and yard tracks are costing \$190,000. The two warehouses, fire-proof throughout, cost \$434,000.

Other items in the breakdown of the entire terminal cost include: office and utility building, \$35,000; electric and domestic water supply, \$25,000; paving warehouse area and apron, \$36,000; freight handling equipment, \$92,000; storage tanks, \$45,000; engineering, miscellaneous and contingencies, \$78,000; grading and drainage, \$311,000; four miles primary State Highway to be built by the State Highway Department without cost to the city, \$240,000; land, \$175,000.

The Only Way Forward

(Continued from page 32)

penalty.

Germany has put its iron heel on the right of the individual and war is the penalty of this present day slavery.

If the United States continues to suppress the individual we will pay a price beyond the imagination of men.

There is being injected into the "have-nots" in the United States today, the belief that they have a right to get something for nothing from the "haves."

Emotional sentiment must not be allowed to replace common sense.

There has been a good deal of talk about the "share-cropper" and other people who have small incomes with plenty of work to do. I do not know personally about the "share-cropper" of today, but I do know that a man is infinitely better off to do something and get a small share

(Continued on page 61)

Defense Program Awards in the South

(Continued from page 56)

"	1	Battleship	Norfolk Navy Yard	Norfolk	Under const.	
"	2	Minesweepers	Norfolk Navy Yard	Norfolk	Under const.	
"	1	Minesweepers	Norfolk Navy Yard	Norfolk	To be built	Unit Cost
Maritime Comm.	1	Tanker	Newport News SB & DD Co.	Newport News	Under const.	3,129,667.00
"	1	C-3 Pass.-Cargo	Newport News SB & DD Co.	Newport News	Launched	2,890,000.00
"	5	C-3 Pass.-Cargo	Newport News SB & DD Co.	Newport News	Under const.	2,890,000.00
"	1	C-3 Pass.-Cargo	Newport News SB & DD Co.	Newport News	To be built	3,630,000.00

WEST VIRGINIA

Qtmtr. Corps	Blue Jay Mfg. Co., Huntington	Mosquito bars (Gov't material)	10,000.00
"	Blue Jay Mfg. Co., Huntington	Trousers (Gov't Material)	45,012.00
"	Berkeley Woolen Co., Martinsburg	Uniform cloth	116,500.00

INLAND WATERWAYS CORPORATION

Operating the FEDERAL BARGE LINES OFFERS FOR SALE GRAIN TRANSFER FACILITIES AT HELENA, ARKANSAS

(Exclusive of Land)

Facilities complete for transferring grain from railroad cars to barges with estimated capacity of 9,000 bushels per hour, consisting of car unloading hoppers connected with a 30" belt conveyor 578' long to barges. Equipped with car pullers and unloading shovels. All electrically operated. Built 1927. Sealed bids will be received and publicly opened 2:00 P. M., September 5, 1940.

FOR FULL INFORMATION
ADDRESS

J. S. POWELL, VICE PRESIDENT
211 Camp Street New Orleans, La.

Agencies Wanted

MANUFACTURERS' AGENT, headquarters in Atlanta, wants accounts to offer in Georgia and surrounding territory. Intelligent and aggressive representation assured. References upon request. Address P. O. Box 334, Atlanta, Georgia.

New Pulp and Paper Mill in the South

(Continued from page 58)

Shartle Bros. Machine Company—jor-
dans, beater, etc.

Layne-Central Company—four water
wells.

Improved Paper Machinery Company
—bleaching plant, screening and decker-
ing equipment.

Warren Steam Pump Company, Inc.—
pumps.

Nash Engineering Company—vacuum
pumps.

Carthage Machine Company—barker
and chipper.

Foster Wheeler Corporation—conden-
ser.

Officers of the company are: James H. Allen, President; A. D. Pace and J. C. Pace, Vice Presidents; J. McHenry Jones, Secretary; H. Hilton-Green, Director; R. G. Seip, Chief Engineer; and John Gamble, General Manager. Hardy S. Ferguson of New York is Consulting Engineer, and the Rust Engineering Company of Pittsburgh will build the mill.

The Only Way Forward

(Continued from page 60)

than he is to do nothing and get a large share, and "Relief" has often given men more for doing nothing than an honorable job paid them for doing something. I would rather do something and get nothing than to do nothing and get something.

I personally know something about starvation life on a farm, but thank God it was a challenge to build character regardless of the returns from the crop.

Life is strangely compensative.

AUGUST NINETEEN FORTY

CLASSIFIED . . . OPPORTUNITIES

Machinery and Supplies

MOTOR BARGAINS
220-440 Volt, 60 Cycle, 3 Phase, 3450 Speed
Each
2—20 H.P. Continental Motors . . . \$60.00
1—30 H.P. Fairbanks Morse Motor . . 72.00
1—75 H.P. General Electric Motor . . 100.00
220-440 Volt, 60 Cycle, 3 Phase, 1750 Speed
1—25 H.P. Fairbanks Morse Motor . . \$72.50
1—50 H.P. Allis Chalmers Motor . . 95.00
1—100 H.P. Robbins & Myers Motor . 148.50
1—200 H.P. General Electric Motor . 200.00
PRICES COVER MOTORS ONLY AND
ARE CASH F.O.B. CHICAGO. SUBJECT
TO PRIOR SALE. MANY OTHER SIZES
IN STOCK.

BUTLER ELECTRIC COMPANY,
1885 Milwaukee Ave., CHICAGO

FOR SALE

Two drum-type Otis electric passenger elevators, complete with cabs, electric interlocks, doors, and sundries.
Operation: Car switch on direct current.
Speed: 200 ft. per minute.

Present Travel: Basement to 5th floor, approximately 75 ft.

Platform of cabs: 6 ft. x 6 ft., approximately.

Delivery in early November.

Apply to Lovemans, Inc., Chattanooga, Tenn.

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MANUFACTURERS—Write for our FREE
Classification Sheet of Inventions for Sale,
covering 135 main subjects, and in one or
more of which you will doubtless be in-
terested. ADAM FISHER CO., 378 Enright,
St. Louis, Mo.

Positions Wanted

POSITION WANTED:—Engineer. Age 57,
connect with municipality, prepare new
street maps, bring old ones up to date. Utility or mfg. co. Same with property plans showing building, location, equipment, etc. Familiar with Southern conditions. Address No. 9464 care Manufacturers Record.

An extremely ambitious salesman of 25 would welcome an opportunity to talk with an executive of a progressive manufacturing concern who could offer him sales or promotional work. Six years of diversified work and intensive study with his present company should be valuable. If you will open the way for a personal interview, you will be quickly convinced of his sincerity, ability and determination to succeed. Address No. 9467, care Mfrs. Record.

EXECUTIVE OR EXECUTIVE ASSISTANT, extensive practical experience in sales and advertising; mechanical engineering graduate. Broad knowledge of recent Federal legislation, and very wide acquaintance with members of both major political parties in Congress. Age 39, excellent references. At present an associate and financial adviser to a prominent person in public life, but anxious to get back into private industry. Address Box No. 9468, c/o Mfrs. Record.

Factory Sites

Leitchfield, Ky., population with suburbs, 2300—located 55 miles S. W. Camp Knox on I. C. R. R. connected with 2 High Type Highways. Plenty water—gas—power and labor available. factory site donated—exempted from City taxation for five years. Write Zay Jones, Mayor.

A community free of all labor troubles, anxious for industry, can offer cement building ideally located on side tracks of main line of Seaboard Railroad. Tax exemptions, with plentiful supply of Southern Pine and Hardwoods available. Write, wire or phone Andrews Civic Club, Andrews, South Carolina.

WANTED: AIRPLANE FACTORY
in Lewisburg, Tennessee. Will give free use of buildings and grounds.
Rowland Lunn, Lewisburg, Tennessee

Ten acres level, cleared land adjacent to Republic Steel Plant, Gadsden, Alabama. Ample labor, steel material, housing and transportation facilities. Inquire R. B. Maguire, 5405 S. 6th Court, Birmingham, Ala.

Manufacturing Plant

FOR RENT OR SALE:—
A small Manufacturing Plant—brick, concrete and steel building with large lot—boiler, Corliss Engine, Belts, etc. In fact a complete power equipment, also line shaft with clutches and pulleys.

Located in City—RF&P Railroad siding on property.

Fredericksburg is ideally located with many advantages—plentiful supply of native labor, skilled and unskilled happy home loving people. Address—

Edgar M. Young, Fredericksburg, Va.

For Sale or Lease

SOUTHERN MANUFACTURING EX-
CEEDS ELEVEN BILLIONS ANNUALLY
Brand new manufacturing plant located in progressive industrial and agricultural section of northern Mississippi. Reinforced steel and brick construction building 80 x 150 feet—two stories with twenty thousand square feet of floor space. Wired for light and power. Equipped with sprinkler system, steam heat and freight elevator. Located on main line of Mobile & Ohio Railroad and paved highway extending from Gulf to Great Lakes. Ample supply of white and colored labor. Reasonable concessions and fullest cooperation offered to interested parties.

For further particulars address,
CHAMBER OF COMMERCE,
OKOLONA, MISS.

Coal Land

BUSINESS—Real estate, machinery and mineral rights of former \$500,000 coal corporation, 600 acres rich bituminous coal land located just outside of Richmond, Va., a manufacturing city of 200,000, and a ready market for your entire output. Coal selling here at \$9 per ton, can be mined for \$2.10. Slope opened with 7-foot vein faced up, fully equipped with latest machinery to mine 300 tons per day. A gross business of \$190,000 was done last year. Land, machinery and improvements cost \$80,000, on account of other business, will sell as a whole for \$35,000. This proposition has merit and worthy of your consideration. For full particulars, write James E. Timberlake & Son, agents, 601 E. Franklin St., Richmond, Va.

Business Opportunities

For Sale—Townsite on prettiest lake in South Florida. Excellent rail and highway facilities, lights, soft water, hotel, stores, \$50,000 worth of streets, good school, congenial people and no bonded debt. Unusual opportunity for developer of means. For details write "Florida", c/o Mfrs. Record, Balto., Md.

Wanted: To communicate with factories for close outs in low priced shoes, clothing, dresses, etc. to meet competition of bankrupt stocks. Must be cheap or cannot handle. Jay Fraley, Pikeville, Ky.

RESALE MACHINERY DEPARTMENT

TRANSFORMERS

SALES AND REPAIR SERVICE



3-400 KVA Gen. Electric Transformers, \$900.00
60 cycle, 22000-2300/4000Y volts. EACH

We carry a complete stock. Write for Catalog No. 135-E
All transformers guaranteed for one year.

WANTED: Transformers, burned-out or in operating condition

THE ELECTRIC SERVICE COMPANY, Inc.
"America's Used Transformer Clearing House" "Since 1912"
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Color Printing Machine FOR SALE

1 Special Single Color Printing Machine with 62" cylinders to accommodate material 60" in width, complete with synthetic rubber rollers and direct motor drive 550 volts 3 phase 60 cycle variable speed control, completely wired with push button control. Never been used to any extent, and good as new.

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Henderson, N. C.

Diesel Eng. Generator

150 KVA Fairbanks Morse 3 ph., 60 cy., 240 vo., 254 RPM, Type D Alternator, direct connected to 180 H.P. 3 cyl. Vert. Type Y, Style VA Fairbanks Morse Diesel Eng. With Exciter, Switchboard, Oil Tanks, Starting Compressor & Tanks, Fuel Pump and Water Circulating Pump.

EXCEPTIONALLY FINE CONDITION.
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Modern AIR COMPRESSORS

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150 H.P. 720 RPM. 3/60/2200, General Elec. MT
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AC GENERATORS
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300 KVA. 600 RPM. 3/60/240, General Elec. ATR

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5 KVA 3/60/220 V. AC dir. con. Le Bol engine

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60 KVA. 3/60/2400, Fairbanks-Morse dir. con.
70 H.P. style VA Diesel engine, complete

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SUB STATIONS
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4-700 HP. G.E. 2300/3/60 393 rpm.
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1-170 KVA AC Gen. D/C Full Diesel Engine.
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825 H.P. 25 cycle motor.
8x8 Curtis air compressor.
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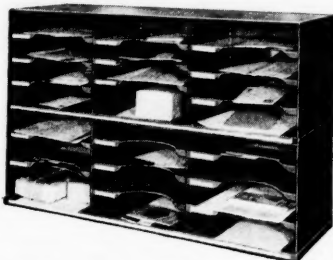
FIRE PUMPS

FOR SALE
Two 1,000 gallon reciprocating
steam fire pumps.
Mathews Cotton Mill, Greenwood, S. C.

Lyon Sorting Rack

(Continued from page 44)

Each rack is 34 1/4 inches wide by 11 1/2 inches deep by 10 1/2 inches high. Spot welded construction has been used throughout to make a rigid piece of furniture, and it is claimed by the manufacturer that the baked-on Lyon green enamel will preserve the new appearance and attractiveness of the rack for years.



Sorting Rack Features Recessed Bottom and Hand-Removable Shelves.



New 500,000-gallon elevated tank recently completed for the City of Jackson, Mississippi; structure is one of Chicago Bridge and Iron Company's radial-cone bottom tanks of Colonial design and is 80 feet to bottom. Chicago Bridge and Iron Company built a 500,000-gallon tank of slightly different design at Jackson several years ago.

METAL WORKING MACHINERY

BUFFERS, 6 HP Van Dorn, 72" spindles, AC mtr.
HAMMERS, Several steam drop and board drop.
LATHE, 60"x18" Niles belt drive, 12' centers.
LATHE, 54"x16" Johnson, motor drive, 9' centers.
LATHE, 32"x24" American, belt dr., 16'9" centers.
MILLER, #2 Brown & Sharpe Uni., belt, low price.
PIPE MACHINES, 2-4 1/2" Oster, 2-4" Landis.
PLANNER, 36"x36"x8" Cincinnati, 2 hds., R.T.
PRESS, C-5 Ferracute inc., 50 ton cap.
PUNCH, G. Rock River 3/4x3/4" mtr.

SYNCHRONOUS MOTOR DRIVEN

AIR COMPRESSORS

1722 cu. ft. CHICAGO type OCE 3/60/2300
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944 cu. ft. ING.-RAND type XRE 3/60/440
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9-1-4 compartment Blaw Knox 120 ton level capacity with extra 100 barrel cement compartment and separate aggregate, cement and water weighing device.
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CRUSHERS

5-Gyratory Crushers: 1-No. 5 Allis-Chalmers. 1-No. 5 Austin. 1-No. 5 Gates. 1-No. 3 McCully. 1-No. 0 McCully.
10-Baw Crushers: 2-15"x36" Universal. 1-15"x36"

Also: Air Compressors, Blowers, Boilers, Buckets, Conveyors, Cranes, Derricks, Hammers, Locomotives, Mixers, Pavers, Pneumatic Tools, Pumps, Rollers, Shovels and Tractors.
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One Gentry Steel Jib Crane complete built for 15 tons load but now operated to lift 6,000 pounds with air, including all steel and wood supports \$500.00. One 6,000 pound air hoist \$200.00. One 1,000 pound air hoist \$100.00. Six new steel dumping buckets costing \$50 each, sell for \$25 each. Will send photo, plan and specifications on request.
M. E. Reinhart, 281 Chapel Ave., Jersey City, N. J.

FOR QUICK SALE

1-Lorain 77 shovel attachment complete.
1-14 x 12 C.P. stationary compressor with 75 H.P. electric motor.
1-Model "LO" tractor and 12 yard Gar Wood scraper.

North Carolina Equipment Company
Raleigh, N. C.

Lathe, 21"x11" LeBlond 12-Speed Geared Head.
Lathe, 28"x12 1/2" Boye & Ensmes, quick change.
Miller, No. 4 LeBlond, Universal, complete.
Miller, No. 3 Kempsmith, Universal, complete.
Shapers, 24" American and Steptoe.
Shaper, 16" Queen City, gear box motor drive.
Shapers, 16" stroke, Ohio and American.
Air Compressors, Electric Motors, Woodworking and Metal Working Machinery. New and Rebuilt.
CHANDLER MACHINERY COMPANY
122 Houston St. N.E. Atlanta, Ga.

Cypress Tank and Tower

FOR SALE

30,000 gallon cypress tank on steel supports 76 ft. elevation. Good condition.

Price reasonable.

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Staunton, Virginia

FOR SALE

Air compressors, steel guy derricks, steam boilers, hoisting engines, pumps, air drills, marble gang saws, carbide machines, etc.

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Elec.: 676, 1300, 1578, 2200 & 2850 Ft. Bldl.: 308, 540, 676, 870 & 1300 Ft. Diesel: 105, 328, 425, 603, 900 & 1300 Ft. Gasoline: 110, 220, 315, 415 & 500 Ft. Steam: 150, 368, 540, 1500 & 1958 Ft.
CRUSHERS: Jaw 48x42, 16x9, 18x10, 24x13, 36x15, 30x10, 30x15, 36x24, 36x48
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LOCOMOTIVES: Gas and Diesel—4, 6, 8, & 14 ton, 20 ton, 30 ton & 55 ton.
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Electric: 35, 60, 100, 125, & 400 H.P.
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DERRICKS: GUY: 5 ton, 7 1/2 ton, 15 ton
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HAMMERMILLS: 36x24, 24x18, No. 3, 4 & 6
SCREENS: Vibrating: Hummer 4x5 & 3x5
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ENGINE: Diesel: 60 H.P. & 100 H.P. P-M.
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1-Parsons Model 25 trencher, 18"x10 ft.

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1-220 cu. ft. Sullivan WK 314 air compr.

1-320 cu. ft. Sullivan WK 314 air compr.

4-330 cu. ft. Worthington air comprs., Model K.

2-110 cu. ft. Sullivan air comprs., WK 312, on E.M.C. 1 1/2 ton pneumatic tired auto trucks.

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1-90 cu. ft. Ingersoll Rand air compr., on Model A 1 1/2 ton Ford truck, with pneumatic tires.

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